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QUEENSLAND AGRICULTURAL JOURNAL

Volume 57 1 AUGUST, 1943 Part 2

Event and Comment

Post-War Reconstruction.

COMPREHENSIVE in scope and practical in suggestion, the evidence submitted to the Commonwealth Rural Reconstruction Commission in the course of the period of its visit to Queensland last month may be taken as representative of informed opinion in this State on post-war agricultural problems. One of the biggest national problems will be to "find gainful and useful employment for a vast number of demobilised servicemen and workers in war industries until such time as each can be reabsorbed in a normal peacetime occupation." The quotation is from a report of the Queensland Branch of the Australian Institute of Agricultural Science on post-war rural reconstruction, which was submitted to the Commission for consideration. Coming from men actively associated with primary production, this report has an especial interest for Queensland farmers, and the following summary is presented accordingly:

Both temporary employment on agricultural development and conservation of the natural resources of the country, and the ultimate absorption of people in land industries have been considered. The view is taken that further land settlement is justified only when efficient use of the land is assured, and such an assurance depends on the suitability and fertility of soils, topography, accessibility, and a satisfactory market for the crops produced.

Stability of primary industries should be the ultimate aim of agricultural policy. Consequently, the development of those industries should be along the lines of increased efficiency in production rather than of expansion of the acreage cropped, with provision for orderly marketing and distribution. Accepting the view that the producer should be regarded as holding his land in trust for succeeding generations, agricultural policy should provide not only for the development of farming land, but for its right use and conservation.

Land Settlement.

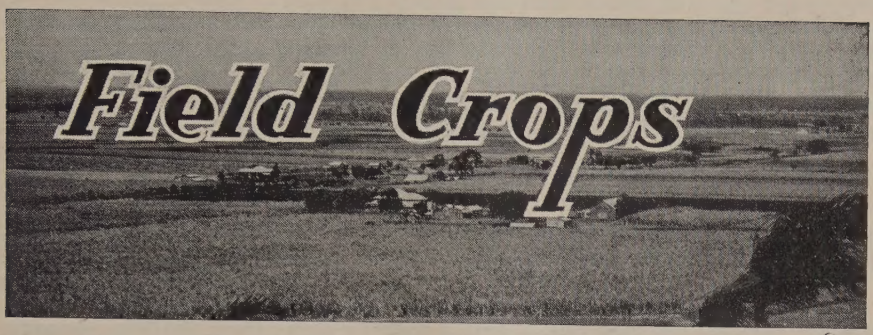
THE opinion is expressed in the report that it would be wrong to encourage the settlement of large numbers of people on the land without some check on the indiscriminate production of crops for which there is no assured profitable market. It is submitted, too, that the soundness of most branches of agriculture depends largely on increasing the efficiency of production on existing farms. To avoid alternating gluts and shortages, systems of crop control are suggested. In the placing of ex-servicemen on the land, it is suggested that special attention should be given to the practical training of inexperienced prospective settlers; to the suitability of the land for particular crops or for particular branches of animal husbandry; to making available partially developed holdings to settlers; to soil and water conservation; to efficiency in farming practice, including liming, fertilizing and weed control; and to the standardisation of implement parts.

Among other submissions in the report is the statement that successful land settlement schemes depend not only on the choice of suitable locations for farms, but also on the suitability of the settlers themselves for a life on the land and their capacity for efficient farm management. Many of the failures of the past have been due to the attitude that farming is an occupation which can be engaged in by inexperienced men, or even by those who are unfit for any other sort of employment. While there is always scope for unskilled rural labour, successful farm management calls for aptitude and knowledge of the job. The unskilled and inexperienced man is likely to be forced off his holding, impoverished and disillusioned, before he has learnt his trade by hard experience; and the man who is temperamentally unsuited for farming may never become efficient. Apart from the human factor, it should not be forgotten that the soil is a national asset which can be frittered away by misuse.

Agricultural Training.

OF the men who desire to go on the land when their war service is over, there will be at least two groups for whom some form of farm training will be necessary. Of these groups, the first will include men with some experience, but who desire to change over to some other class of farming from that in which they have been previously engaged; the second class will include men who have had no experience, of whom many, having joined the Services at an early age, have had no opportunity of learning at all. A scheme by which training could be given up to a reasonable standard of efficiency, and which would provide sustenance during the period of training, is suggested. Such a scheme would provide for some form of farm apprenticeship, and it would have an advantage as a preliminary try-out as to suitability for farming and, of course, farm management. It would provide for apprenticeship to approved farmers, who have successfully applied modern methods in their industry, for, say, a year at least so that the whole seasonal cycle of farm operations could be observed and practised under experienced direction.

In its wide scope, the report under review covers many other points for consideration in planning a post-war policy for rural industry, including a practical recognition of the relationship between forestry and farming—especially in respect of the control of soil erosion, prevention of the silting-up of watercourses, the grazing of forest reserves, and so on.



Potato Culture.

C. J. McKEON, Director of Agriculture.

PART II.

Harvesting.

IN Queensland, harvesting of the spring crop is usually carried out as soon as it can safely be undertaken, one of the chief objectives being to get the potatoes on the market as early as possible, since good prices are usually obtainable at the commencement of the season. The hot weather, which normally prevails when the spring crop is due for harvesting, and the risk of damage by the potato tuber moth, which is then particularly prevalent, also makes it necessary to harvest the crop as expeditiously as possible. In their anxiety to get the potatoes on the market at the earliest possible date, however, growers frequently make the mistake of digging them before the skins are firm enough, with the result that they arrive on the market in a badly rubbed condition and consequently bring a reduced price. As the autumn crop ripens during the cooler months of the year the tubers may be left much longer in the ground after the crop has ripened than is the case with the spring crop, and, if desired, digging need not be carried out until the tops have completely dried out.

Harvesting is still very largely carried out with a digging fork. A plough is also sometimes used to turn the tubers out but, although this is a quicker methor than hand digging, the crop cannot be harvested as thoroughly when a plough is used. Different makes of mechanical diggers are employed to a limited extent and some of these do very good work in clean crops and on certain classes of soil but, so far, no machine is available which will perform satisfactorily under all conditions.

The tubers, after being dug, should not be left exposed for any length of time to the hot sun and they should be bagged and removed from the field as quickly as possible. Furthermore, the bagged tubers should on no account be covered with the tops while standing in the field, as this is one of the surest ways of introducing the pest to the bagged tubers.

Grading and Marketing.

When preparing tubers for market they should be carefully graded, because a nice, even-sized line of potatoes will almost invariably command a better price than an uneven sample. Care should be taken to reject any tubers which are damaged or show signs of potato tuber moth

infestation, and on no account should tubers with rubbed skins or with dirt adhering to them be included when bagging. The tubers should be packed firmly in the bags, but not too tightly, as such tight packing is likely to cause bruising, which will be followed by decay. Too loose packing is equally objectionable for the same reasons.

Grading of potatoes is now compulsory and no person may sell or offer for sale in Queensland any potatoes which do not comply with one or other of the following grade standards as prescribed under "*The Fruit and Vegetables Acts,* 1927 *to* 1939."

"No. 1 grade shall consist of sound potatoes which shall have similar varietal characteristics and a mature skin; they shall be reasonably free from second growth, decay, mechanical injury and greening from exposure, dirt, and other foreign matter, and from damage caused by disease, sunburn, or insects, and shall be not less than three ounces in weight."

"No. 2 grade shall consist of potatoes which comply with the standard of No. 1 grade except as to maturity of skin and weight. They may have either a mature or immature skin, and shall be not less than one and a-half ounces but less than three and a-half ounces in weight."

"Seed potato grade shall consist of sound potatoes which shall have similar varietal characteristics and a mature skin; they shall be reasonably free from second growth, decay, mechanical injury, dirt, and other foreign matter, and from damage caused by disease, sun scald, or insects, and shall be not less than one and a-quarter ounces in weight."

"Chat grade shall consist of potatoes grown in Queensland which comply with the standard of No. 1 grade except that they shall not have a mature skin and shall be less than two ounces in weight."

"New potato grade shall consist of potatoes which comply with the standard of No. 1 grade except that they shall not have a mature skin, and shall be not less than three and a-half ounces in weight."

"Potatoes shall be deemed to comply with the standard of a grade if at least ninety-five per centum by weight comply with that standard."

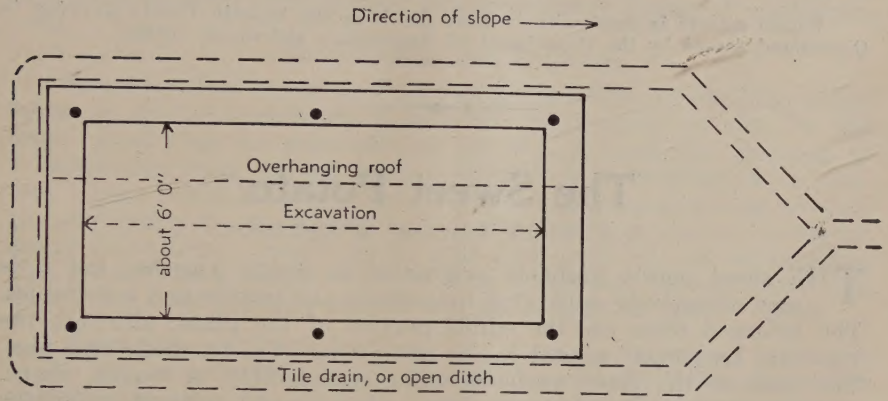
"Every bag or container shall be clearly and legibly stencilled with the name and address of the grower of the potatoes and the grade and the name of the variety thereof in letters and figures not less than one and one-half inches in length, and in the case of seed potatoes every bag or container shall also have the word 'SEED' clearly and legibly stencilled thereon."

Storing.

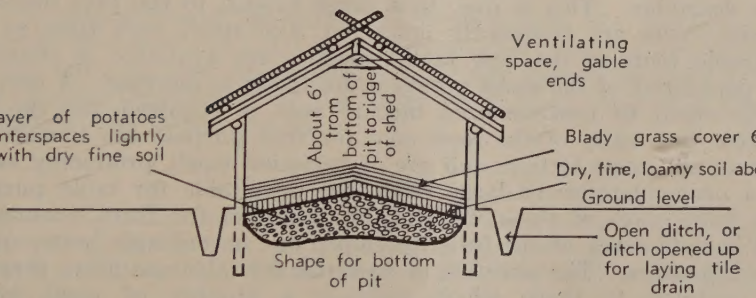
Much greater difficulty is experienced in storing potatoes from the spring crop than is the case with the autumn crop owing to the fact that they require to be stored during the warmer months of the year when the potato tuber moth is likely to cause serious loss. Should that pest be present, fumigation with carbon bisulphide is called for. Only sound, dry, unblemished potatoes should be stored, and these should be spread in successive shallow layers with a layer of dry grass between each layer. Light should be excluded, but at the same time the store room should be well ventilated.

Storing in pits (Plate 19) is also resorted to where large quantities of potatoes have to be stored, a naturally dry piece of gently sloping land being chosen as the site of the pit. The pit should be excavated lengthwise down the slope, it should be 1 foot in depth and 6 feet in width, and of sufficient length to accommodate the quantity of potatoes to be stored. If damage by rodents is anticipated, the pit should be

SKETCH OF SMALL STORAGE PIT FOR POTATOES



GROUND PLAN


Ventilating space, gable ends
About 6' from bottom of pit to ridge of shed
12" layer of potatoes with interspaces lightly filled with dry fine soil
Blady grass cover 6"
Dry, fine, loamy soil about 5"
Ground level
Open ditch, or ditch opened up for laying tile drain
Shape for bottom of pit

SECTION OF STORAGE PIT

Plate 18.

Sketch of Small Storage Pit for Potatoes.

protected by a sunken galvanised iron barrier. Suitable open drains should be provided or agricultural drains should be laid, the bottoms of the drains being 8 inches below the level of the bottom of the pit, the latter being so sloped that any moisture will be drawn naturally into the drains. A low shelter shed with wide eaves sufficiently high to work under should be constructed of bush timber covered with bark, such as stringy bark, which is also used for covering the gable ends and sides. Ventilation should be provided at the gable ends and 6 inches of ventilation should also be provided near ground level along each side.

The potatoes must be handled carefully when filling the pit in order to prevent bruising and the operation should start at one end. A single layer of potatoes is placed in position and fine dry soil or fine dry peaty vegetable matter is scattered over them in quantity sufficient to lightly fill the spaces between the tubers. This procedure is repeated until a layer 1 foot in depth is obtained, the whole then being covered with 4 or 5 inches of dry soil or peaty vegetable matter, which, in its turn, is covered with 6 inches of blady grass or other somewhat similar suitable covering.

Potato culture is dealt with in more detail in the bulletin *Potato Growing in Queensland*, issued by the Department of Agriculture and Stock (1942).

The Sweet Potato.

J. A. KERR, Instructor in Agriculture.

THE sweet potato probably originated in South America, but it is now extensively cultivated throughout the tropics and sub-tropics. The enlarged roots are the edible portion of the plant, although the vines are frequently grazed by, or are cut and fed to, cattle and pigs. The roots of the many varieties differ considerably in length, shape, and the colour of the skin and flesh. Climatic and cultural conditions may also cause a slight variation in the shape of the roots.

The value of the sweet potato, particularly for the table use, is not appreciated to the extent that is warranted by the inherent merits of that vegetable. This is due, to a large extent, to the fact that poor-quality roots are frequently marketed, and until such time as only desirable roots of the best table varieties are available to consumers the popularity of the sweet potato is not likely to increase. A comparatively small to medium-sized mature root is required for the table market, but many of the roots sold for that purpose are immature or contain an excess of fibre and are of varieties which, producing as they do a preponderance of large roots, are unsuitable for table purposes. The large roots of these varieties are retained for farm consumption and include many of the fully developed and accordingly better quality sweet potatoes. The selection of varieties for table use must, therefore, be confined to those which produce a number of good quality, medium-sized roots; the larger varieties, of which only the comparatively small and often immature or otherwise inferior roots are of a size suitable for marketing, should not be drawn on to supply the table market.

The flesh of mature sweet potato roots varies according to the variety, it sometimes being of a rather dry, floury nature, while in other cases it is of a moist and slightly sweeter nature. Each of these types of root is produced by a number of recognised varieties, and if only well-selected, evenly graded roots of such of these as are table varieties were marketed for table use an increased demand would be created, particularly for the moderately moist type, such as is represented by Porto Rico.

Roots which are unsuitable for marketing are of considerable value for pig-feeding purposes, and may be fed in either a raw or boiled

state. The crop may also be grazed by pigs, but when this is done the usual ration of skim milk or concentrates should be continued. Pigs are also of value for cleaning up paddocks after the crop has been harvested.

Climatic Requirements.

The sweet potato requires a warm climate and a growing season of from three and a-half to five months. It does best in districts enjoying a moderate rainfall, for heavy and prolonged rains frequently encourage excessive vine growth and poor development of marketable roots.

Suitable Soils and Rotations.

Sweet potatoes can be produced on a wide range of soils, but sandy loams or similar open-textured soils are particularly suitable for the crop. Providing the soils selected are well drained, the presence of a moderately heavy subsoil is no disadvantage in growing sweet potatoes. Deep friable soils frequently produce long irregular roots, whereas the occurrence of a moderately heavy subsoil tends to produce a compact better-shaped root. Heavy fertile soils frequently produce an excessive vine growth and a reduced yield of roots. Moreover, on heavy stiff soils the roots are often badly shaped and are subject to growth cracks.

Sweet potatoes thrive best when an abundance of humus is present in the soil, and for that reason poor sandy soils are unsuitable unless they are carefully rotated with green manure crops. Like most crops, sweet potatoes respond to a suitable rotation, the use of cowpeas as the crop proceeding the sweet potatoes being particularly valuable in the rotation.

Preparation of the Soil.

The preparation of the soil should be thorough. The first ploughing should be to a depth of 9 inches, but if the sweet potatoes are intended for the table market, subsequent ploughings should be shallower to allow a slight compacting of the lower layer of the soil, thus tending to produce better-shaped roots.

Varieties.

A considerable number of varieties have been introduced to Queensland, four of the best known of these being Porto Rico, White Yam, Director, and Pierson. These varieties are described in the following paragraphs.

The Porto Rico variety (Plate 19), at present probably the most favoured in market demand, has a leaf of variable shape, which is, however, mostly large and shouldered and is possessed of a very long leaf stalk; its veins are purple with a vivid purple spot at the base of the midrib. The purple stem is of medium length and diameter, and this variety generally produces an abundance of vine and leaf. The root is usually of a swede turnip shape and is normally well bunched round the main stem; its skin is pink and its flesh yellow. This is a high-yielding variety which is generally earlier than the varieties remaining to be discussed.

The White Yam variety has a large, broad, round or slightly shouldered, dark-green leaf with green veins. Its thick, medium-length stem is also green with purple tinges. The globular root is of medium size and has a smooth, white skin and white flesh. The roots are fairly well clustered round the main stem.

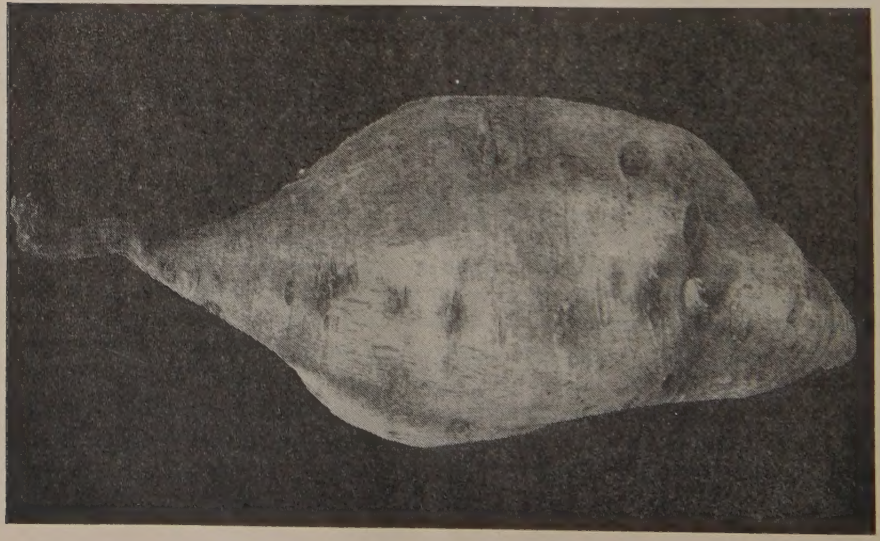


Plate 19.
Porto Rico.

The leaf of the Director variety is large, broad, and shouldered, and has very long leaf stalks; the veins are tinged with purple and there is a purple spot at the base of the midrib. The pale-green stem is long and thick and there is a purple patch in the leaf axil. The large roots are rather thick and long and their skin and flesh is white.

The dark-green leaf of the Pierson variety is long, large, and round in shape and has green veins. Its long, thick stem is white in colour, but the older portions show a purple tinge. The large, pear-shaped root has a smooth white skin, with white flesh. The roots are fairly well bunched round the main stem.

Planting Material.

The sweet potato is propagated by means of slips or cuttings, and in order to maintain both yield and quality, regular selections of roots for slip or cutting production should be made each year in the field from suitable plants. The selection should be confined to plants producing satisfactory yields of smooth, well-shaped, marketable roots of a type characteristic of the variety to be propagated. The smaller roots from these plants should be reserved for propagation purposes and, after exposure to the sun for a few hours, they should be stored in dry sand, in which they will keep for several months.

The term "slip" refers to the shoots which develop on the sweet potato root when it is bedded in sand or left in the soil, the term being applied to the shoots when they are 6 to 8 inches long. The slip generally possesses a number of fine roots, which usually are in greater profusion when the slip is produced in a sand bed instead of in the field soil. If it is left on the parent root, the slip will develop into a large vine, which may be cut into suitable lengths or "cuttings" for planting purposes.

The use of slips may be necessary for propagation purposes in districts in which the growing season is short on account of prolonged winter conditions. In such districts, the selected roots should be placed in prepared, protected sand beds some weeks before the time when the final frosts normally occur. They should be covered by sand to a depth of several inches, each root being slightly separated from its neighbour. In particularly cold districts the use of bottom heat may be necessary, and this may be obtained by forming the sand beds over a depth of from 6 to 8 inches of fresh manure. Sufficient water should be applied to the beds to encourage the roots to develop the required slips, which can be removed from the parent root, for planting, when they are about 6 to 8 inches long. Two or three collections of such slips may be made from each bed. Two to three hundredweight of roots are required to produce sufficient slips to plant an acre from a single collection.

In most districts in Queensland, however, the general practice is to use cuttings for planting, and, providing these are planted under favourable weather conditions, they readily become established. For the production of cuttings, root selections should be made as for slip production, but the roots are then planted in rows in cultivated soil without the special preparation of beds required for slips. A sheltered site should be selected for cutting production and an application of farmyard manure is beneficial. Cuttings about 12 inches long should be made from the resultant vines, and these should be chosen from towards the growing ends of the vines, care being taken to avoid the

tough portions near their bases. These tough portions rarely produce plants and yield equal to those obtained from the other portions of the vines, the growing tips probably representing the ideal cuttings. When conditions are favourable, the vines make very rapid growth, and the number of roots required to produce planting material as cuttings is considerably less than the number required when slips are to be planted. From 50 to 100 roots produce sufficient cuttings to plant several acres.

In districts which are free from frost, the plants continue to grow from season to season, and the area on which they are growing eventually becomes a dense mass of vines. The satisfactory selection of planting material from the most desirable type of plants is an extremely difficult matter on such an area and selection therefrom is a practice that is likely to result in the deterioration of both quality and yield. Should it be impossible to obtain planting material elsewhere, then only the new season's growth should be used from such an area.

Planting.

Planting of the slips or cuttings may be carried out as soon as it is considered that frosts have ceased to occur, providing, of course, that weather conditions are otherwise suitable. Planting can be successfully continued until January. Later planting can be recommended only for localities which are free from frost or in which early frosts do not occur.

Cloudy or showery weather is ideal for planting and the soil should be in a moist condition when this operation is carried out. The slips or cuttings are planted in rows from 3 feet to 3 feet 6 inches apart and are spaced from 18 to 24 inches apart in the rows. Long cuttings should be avoided, the best length thereof, as already indicated, being 12 inches; only one joint of the cutting should be buried in the soil, and then to a depth of 4 to 5 inches.

Several methods are used for planting, the most popular and also the most reliable method being hand-planting by means of a spade or other tool suitable for opening the soil. The spade is driven into the soil to the desired depth and then pressed slightly forward to permit of the slip or cutting being placed in the cavity at the back of the spade. When the spade is withdrawn the soil should be pressed firmly around the slip or cutting, using either the hand or the foot for that purpose. The plants may also be ploughed in, and where this method of planting is adopted the field is reploughed and the slips or cuttings are placed in the furrow while the ploughing is in progress, only every third or fourth furrow, of course, being planted. Alternatively, on prepared soils, furrows are opened across the paddock at the required distance apart, and after placing the slips or cuttings in each furrow, a second furrow is ploughed alongside it so as to cover the planting material. Rolling with a suitable heavy roller of large circumference to compact the soil around the slips or cuttings is necessary when the planting material is ploughed in by either of the methods just described.

Planting on ridges approximately 6 inches high, which have been raised by means of the plough and flattened on top by the harrow, is a method which is frequently practised. The ridges provide a warm well-drained situation for the tubers and, in addition, the harvesting of the crop is simplified by the adoption of this system of planting.

On warm well-drained, sandy loams ridging is not as necessary as is the case on heavier types of soil, except in districts in which prolonged wet weather is likely to be experienced.

Cultivation of the Crop.

Row cultivation by scufflers should be carried out whenever necessary until the spread of the vines render further inter-row cultivation impracticable. On well-prepared land very little inter-row cultivation, however, should be necessary.

Various practices, such as nipping the tips of the vines, cutting off the vines at a distance of 2 to 3 feet from the base, and lifting the vines from the ground and rolling them back to prevent the formation of surface roots have been recommended. The result of such practices have been somewhat inconclusive, and there is some doubt as to whether any constant increase of yield may be expected from their adoption.

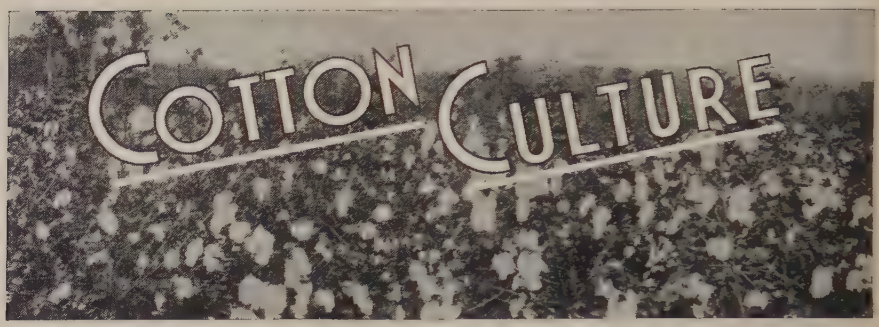
Harvesting.

Sweet potatoes are ready for digging when the sap on an open cut dries out a white colour rather than a greenish black. Care should be exercised when digging, because sweet potatoes bruise very easily, though a clean cut usually callouses over. The most satisfactory method of harvesting is by hand digging, using a hoefork or a digging fork, but occasionally on large areas the roots are ploughed out, a disc coulter being attached to an ordinary single-furrow mouldboard plough for that purpose. This method of harvesting is undesirable if the roots are intended for the table market, but is not objectionable in the case of roots required for stock feeding purposes, especially if they are to be consumed shortly after harvesting. No satisfactory mechanical digger has yet been evolved. The roots should be carefully graded and marketed in a clean, attractive condition.

A recent bulletin, "The Sweet Potato," contains illustrations of other varieties grown in Queensland. This bulletin is obtainable on application to the Under Secretary, Department of Agriculture and Stock, Brisbane.

CHAFFCUTTER POWER REQUIREMENTS.

Width of Mouth (in.)	Number of Knives on Flywheel	Approx. Quantity of ½in. Chaff Cut (cwt. per hour)	Power Required (B.H.P.)
9	2	4	1½
11	3	12	4
13	3	20	6
15	5	40	8



Cotton Seed Planting Rates.

W. G. WELLS, Director of Cotton Culture and Senior Research Officer.

APPLICATIONS for cotton seed which have been received during recent years have indicated that there has been a general tendency for cotton growers in some districts to use a rather light planting rate when ordering their seed requirements. This has been due to their desire to reduce costs of production by planting at a rate that would provide a stand of seedlings which would either require only the thinning out of bunches of plants or which could be left unthinned.

Each season many reports are received, however, that an appreciable acreage of the first plantings has been replanted. In some instances the original stand of seedlings has been so thinly spaced that even light attacks by insects quickly reduced the number of seedlings below what would give a final satisfactory plant population. In other cases a rain occurring before the seedlings appeared has crusted the soil sufficiently to prevent the small number of seedlings from breaking through the surface. As the value of obtaining an early stand of healthy plants has been well demonstrated in all districts south of Proserpine, it is obvious that sufficient seed should be planted to ensure the early plantings being maintained.

Investigations conducted at the Biloela Research Station have indicated that when using a variety with seed of medium size the following rates of planting will allow of the planting machine dropping approximately the indicated average number of sound seed per foot of row:—

9 lb. per acre = 2·8 seeds.
10 lb. per acre = 3·1 seeds.
11 lb. per acre = 3·4 seeds.
12 lb. per acre = 3·7 seeds.
13 lb. per acre = 4·0 seeds.
14 lb. per acre = 4·3 seeds.
15 lb. per acre = 4·6 seeds.

In order to ascertain what stand of seedlings could be obtained with such a range of quantities of seed, planting rates of 9 lb., 12 lb., and 15 lb. of delinted seed per acre were used in soil in satisfactory condition for giving a good germination. Actual counts made over an acre of soil indicated that the following number of seedlings per foot of row were obtained:—

A rate of 9 lb. delinted seed equalled 2·05 plants per foot of row.
A rate of 12 lb. delinted seed equalled 3·46 plants per foot of row.
A rate of 15 lb. delinted seed equalled 4·18 plants per foot of row.

It is not recommended that a planting rate be used which will give a stand of fewer seedlings than three to four per foot of row. As the above stands were obtained under very satisfactory conditions for securing a good germination of the seed, it can thus be seen how necessary it is to plant at least 12 lb. delinted seed per acre when using a 4½ feet row spacing. A row spacing of 4 feet would at the same rate of planting per foot require 13·6 lb. delinted seed per acre to give 3·46 plants per foot of row under good conditions.

Growers planting sizeable acreages of cotton often maintain that they cannot afford to employ labour to thin out their crops to the spacings recommended for their soils. They accordingly use a planting rate which will just give a germination of seedlings that will result in a final stand of irregularly spaced plants which will require favourable climatic conditions to yield a profitable return. If severely dry weather is experienced when the plants of such spacings are well laden at mid-season, serious shedding of crop results. Conversely, if very wet conditions are experienced before the plants are well laden, serious shedding of the flower buds followed by rank growth of plant may occur, particularly in crops on fertile soils. Numerous experiments and the experience of many growers have demonstrated that it undoubtedly pays to thin the plants relatively uniformly to the spacings recommended. Growers should therefore plant at a rate which will allow of a good final stand of plants being obtained, even if it necessitates thinning out of the excess plants.

It is also advisable to plant at a rate which will give a sufficient stand of seedlings to allow of cross harrowing being practised. Growers who have tried cross harrowing when the seedlings were well established have found that only one cross harrowing in a season experiencing light rainfall during the seedling stage of the plants markedly reduced the amount of inter-row cultivation required to control weed and grass growth between the rows. In addition the cross harrowing destroyed all weed and grass growth in the rows of cotton, and also served to thin out the bunches of the cotton seedlings, thereby reducing to a minimum the amount of hoe labour required to clean and thin the crop. Where a thin stand of the seedlings had been obtained, however, the cross harrowing tended to destroy too many of them, thus necesitating all of the cultivating being done in the usual manner with either scufflers or riding cultivators. In addition, the employment of the normal amount of hoe labour was required, which is an important factor under present conditions of labour shortage.

It is recommended, therefore, that when ordering their seed requirements growers base their needs on a planting rate of at least 15 lb. delinted seed per acre for cultivated areas. This rate should normally ensure sufficient germination being obtained to give a stand of seedlings that can be cross harrowed and still leave enough plants to obtain a final proper stand. Where it is necessary to use fuzzy seed, as when it is intended to plant a large acreage in the dry soil or where the planter requires the use of this type of seed, a planting rate of 20 lb. per acre should be the basis of ordering seed. For planting with the "walking stick" type of planter in the newly burned scrub areas, it is recommended that a rate of 10 lb. delinted seed per acre be used.

Citrus Pruning.

R. L. PREST, Instructor in Fruit Culture.

Oranges.

Young Trees.—The pruning of young trees should be confined to the removal of adventitious shoots from the stem and the checking of excessively vigorous growths from the main arms. Where possible, it is desirable to build up on three main arms. Two secondary arms may be permitted to grow from the ends of each of these main arms so as to develop a strong and well-shaped top. Other secondary arms will grow but should be removed. Undesirable shoots which grow all along the main arms, and which are obviously out of place, and would by their continued growth weaken the framework of the tree, should be cut away. In instances where awkwardly-shaped trees are received from the nursery, it is often possible to train a shoot, which ordinarily would be out of place, to develop and fill up a gap. Such training involves shortening back the required shoot at some dormant period of growth to a bud pointing in the direction it is desired the shoot should grow. Long, weak limbs that do not show a tendency to branch should be headed back generally to the limit of other growths, so that the tree will grow strong, compact, and symmetrical. The top should not be allowed to become too dense; on the other hand, it should not be kept so open as to permit the sun scalding the main limbs and branches.

Bearing Trees.—Provided that a well-developed framework has been maintained, young, well-grown trees should come into profitable bearing at an age of between four and six years. During the first years of bearing, pruning should be directed towards the removal of sucker growths from the main branches and weak fruiting shoots. Where pruning operations have been diligently carried out on young trees, they actually require very little pruning during the first fruiting years, except that they should be gone over occasionally and suckers removed. Sucker growths may, as a general rule, be considered parasitic, but they do not necessarily remain so, for in many instances they later produce bloom and fruit of normal fullness. This fact can be made use of when necessary in replacing broken and damaged limbs.

There is no doubt that the low production in the case of many older but well cared for orchards is due to the lack of vigorous healthy fruiting wood. This condition points to the necessity for a periodical renewal of fruiting wood, which can best be accomplished by thinning out and at the same time shortening back terminal growths and twigs. The cuts

should be made right back to strong new growths, removing weak shoots and those that have borne fruit. The thinning leaves room for the necessary subdivision, whilst the shortening back tends to force into growth dormant buds from behind, stops the excessive growth of any branches, and at the same time renews supplies of fruiting wood. Where crowding of growth becomes evident, the removal of an entire branch is at times desirable. The entry of plenty of light and air assists the growth of healthy and vigorous shoots behind the outer ring of foliage. These shoots make new fruiting wood, at the same time any excessive growth of suckers or water shoots which arise from well inside the tree following heavy pruning require to be cut away or they will absorb a lot of vigour and crowd the centre.

Old Trees.—In older trees, where growth has become stagnant, provision will require to be made for the removal of old, crowded, and dead limbs. In such instances, pruning is of a much heavier nature, requiring at times the removal of large branches. Such branches should be cut right back to their source of origin so that the sap is readily diverted to the remaining limbs, encouraging the growth of new wood. Under no circumstances, whatsoever, should stubbing be resorted to. In instances where it is necessary to replace a number of large limbs, it is preferable to do the work gradually over two or more years to avoid excessive suckering.

The lower branches of trees should not be allowed to touch the ground, as fruit borne on such branches is generally blemished and of poor quality. On the other hand, trees should not be pruned too high from the ground. The height to which they should be lifted varies according to circumstances, in most instances knee-high will prove to be satisfactory.

In Queensland, the regular thinning and pruning of bearing trees is definitely necessary and should be carried out during the winter months and, where possible, completed before spring growths occur—particularly where regular pruning has been neglected and heavy cutting is necessary. Frequent and regular treatment tends to preserve as nearly as possible the balance between the root system and aerial portions of the tree, assists in economical pest control and cultural requirements, and counteracts unequitable climatic conditions.

Mandarins.

The majority of mandarins when not systematically trained and pruned are often merely shrubs, not trees. They naturally grow very densely, and unless regularly thinned out and shortened back after the fruit has been harvested, the massed twigs become so dense that many perish and the remainder are so weakened that only small, inferior fruits are produced.

The treatment at planting is identical with that of the orange. After the first season from planting, numerous, vigorous, upright shoots arise from the head of the tree. While small, these should be thinned, leaving only those which will assist in building a desirable framework. These should be carefully watched, and where the growth becomes too lengthy they should be shortened back to the limits of other growths. Heading back and thinning may be done when growths have hardened, not when they are soft and growing rapidly. It is possible to check excessive growths by pinching out an inch or so of the tips.

The densely growing habit of the mandarin, particularly such varieties as the Beauty of Glen Retreat, Scarlet, Thorny, and similar types, leading to a profusion of weak shoots, is responsible for overbearing and resultant small and inferior fruits at an early age. Providing that a well-developed framework has been maintained, young, well-grown mandarin trees may be permitted to bear at four years of age. The annual pruning of bearing mandarin trees requires the same regular and close attention as in training and forming young trees. The dense growths and crowded branches require to be well thinned out and shortened back to vigorous laterals of current season growth, removing weak twigs and, where possible, shoots that have borne fruits. In the case of types similar to the Beauty of Glen Retreat, Thorny, and Scarlet, the thinning and shortening back may be described as heavy; modifications should be practised according to the habits of the tree growth of the various types of mandarins. Types such as Fewtrells Early and Ellendale Beauty resemble the orange tree in growth and should be treated accordingly.

The annual pruning, permitting ample light and the ready circulation of air throughout—

(1) Greatly increases the vigour of the tree;

(2) Removes surplus growths and twigs;

(3) Improves the size and quality of the fruit; and

(4) Provides for the renewal of ample, young, and vigorous fruiting wood.

Lemons.

With lemons the general practice with growers has been to prune severely while the trees are young in an effort to control the growth, and so produce a strong framework. In some instances, such treatment has retarded growth, and certainly it has retarded the early fruiting of the trees. Apart from the necessary trimming at planting, which, similarly to oranges, consists of shortening back and removing broken and bruised roots, and a corresponding shortening back of the head of the tree in such a manner as to produce a strong, straight stem with three or four well-placed arms radiating therefrom, little pruning should be done during the first two or three years. All that is necessary is a light thinning to remove any undesirable shoots that are out of place and would later upset the balance of the tree, and perhaps a shortening of excessively vigorous shoots. Main, upright-growing limbs, evenly spaced, should be selected as main leaders. As the tree grows older these limbs become weighed down at the ends by further branching and the weight of fruit; strong side shoots will develop from them. These side shoots should be thinned out, but not all removed. Those left, when hardened, should be shortened back to three or four buds to form spurs, which will produce the best fruit. Suitably placed growths may be left to grow and take the place of the first leaders which have been weighed down.

In time, it will be found the tree is built up of series of tiered branches radiating from the main framework. The object of building up the tree in this manner and spurring is to encourage a fruit-bearing habit. This is explained as follows:—As the fruit weighs the vertical branches down to a more horizontal position, the vigour of the branches is reduced and side shoots arising from such branches are, when spurred as outlined above, conducive to fruit production.

When shortening side shoots, the cuts should be made well back into ripe wood, thus throwing the sap into dormant buds. Light wood issuing from inside the more erect permanent arms may be retained, shortened for spurring, and from time to time renewed. No rank growth should be tolerated, unless it is required to continue the work of some displaced leader.

As the limbs drag down, it will be necessary from time to time to lift them by removing some of the lower limbs.

GARDEN SOIL.

The essential requirements for the successful production of vegetables has lately been frequently stressed through various channels, but it is well for farmers and home gardeners to bear them in mind. Much good effort might be wasted by a failure to appreciate the special conditions required for these crops.

A soil of good depth is the first essential. Absolute figures cannot be stated, but experience indicates that productivity declines significantly as the depth of top soil falls to a few inches. A top soil of at least 7 to 8 inches should be the aim. Where shallow surface soils are cultivated it is advisable to bed-up.

Of equal importance is a liberal supply of organic matter in a well rotted or decomposed state. The physical condition, or tilth, of a soil is largely dependent on the supply of humus or decomposed organic matter in it. For example, sandy soils are made more retentive and clayey soils more friable by the incorporation in them of organic matter. Of importance, too, is the supply of plant food elements made available in the soil by the organic matter in its decomposition. Green manures, farmyard manure, and compost are important supplies of organic matter.

The essential plant food elements—nitrogen, phosphoric acid, and potash—must be in a liberal supply for a vegetable soil to be fertile. On the farm they are usually added in the form of artificial fertilizers. The home gardener can supply or supplement his needs by the liberal use of decomposed manure or compost, and by waste materials of the household, such as kitchen refuse, bones, and wood ashes.

The reaction of a soil or, in other words, its state of acidity or of alkalinity is important. Unfortunately, the degree of acidity or of alkalinity can be determined only by some special means. Limestone or other lime-containing materials is used to correct acidity or "sourness" in soils. In the home garden the use of wood ashes in moderate amounts would help to ameliorate the adverse effects of "sourness."

Other essentials for the successful cultivation of vegetables are conditions of adequate sunshine, good drainage, and, if necessary, soil erosion control.

—W.J.C.

Vegetable Production

Growing Vegetables for Seed.

H. BARNES, Director of Fruit Culture.

THERE is still a serious shortage in some classes of vegetable seeds throughout Australia, in spite of efforts to provide for the needs of all. Each State has undertaken to produce as large quantities as possible of the kinds of seeds which can be grown, but individual growers can assist to overcome the shortage by producing their own requirements. Seeds which can be grown very well in Queensland include pumpkins, marrows, cucumbers, tomatoes, beans, lettuce, and carrots.

There is really nothing difficult about producing seeds. All that is necessary is a little care. Apart from the fact that growers who save their own seed are performing a national service, they are, in fact, assisting themselves in that by careful selection of vegetables for seed production they are improving their subsequent crops and ensuring that their seed shall be disease free. It is not suggested that all vegetable growers should go ahead producing seed indiscriminately for sale, because the production of seed *for sale* is now carefully controlled by Commonwealth Regulations, and growers who desire *to produce for sale* must first register with the Commonwealth Vegetable Seeds Committee at Canberra, and their growing crops must be periodically inspected to ensure trueness of type and freedom from disease. There is, however, nothing to prevent a grower producing seed for his own use, and this is, in fact, encouraged.

The first thing necessary in vegetable seed production is to raise a good crop of vegetables. The crop should be planted so that the seed will reach maturity at a favourable harvesting season. Varieties liable to cross pollination—and most vegetables are—should be planted where contamination from other plants is unlikely to occur.

Pumpkin and Marrow Seed.

Saving of pumpkin and marrow seed is relatively simple, and it is of interest to quote here an extract from volume 1 of *The Queensland Agricultural and Pastoral Handbook*:—

"Selected varieties or strains of these crops are capable of setting a greater number of fruit per vine than other varieties or strains and, therefore, besides providing higher quality fruit, selections are capable of improving yields. Indeed, selected strains are capable of out-yielding poor strains by over 30 per cent. The selection of individual fruit for seed requirements in the barn is unwise, since the fruit selected may be from low-yielding vines or may be exceptional individuals on a vine of poorly-shaped fruit. It is therefore necessary for seed selection to be carried out in the field. This is not as laborious as it may

at first appear, since, after the leaves have fallen, individual vines are fairly distinctively traced. Only well-shaped fruit, true to type, and from vines of high yielding capacity should be selected. Ten lb. of pumpkin will yield approximately 1 lb. of seed; consequently, selections need not be extensive. Contrary to general opinion, the age of seed, provided its germination is not impaired, has no adverse influence on yield, for new season's seed has by experiment been shown to bear as heavily as seed of older origin."

After having selected suitable vines, and pumpkins, it is only necessary to scoop out the pulp, remove the seeds, and dry them in the sun.

Cucumber Seed.

Cucumbers reserved for seed should be left on the vines until the fruit is mature and the vines commence to die off. Similarly to pumpkins and marrows, the grower should select a number of vines which are heavy producers of good fruit and mark them with a stick. He can do this while the vines are growing, so that when picking the young green cucumbers from the area for market the selected vines are not interfered with. Seed sown to produce an early spring crop of cucumbers will usually yield good seed for selection.

When the cucumbers for seeding are properly mature they are cut in halves lengthwise and the seed and juice and portion of the flesh scooped out with a large spoon into a wooden tub, barrel, or earthenware vessel. Iron vessels may be used, but are liable to cause a discolouration of the seed. This does not affect the germinating properties of the seed, but spoils its appearance.

When all the cucumbers have been scooped, the vessel is set aside to allow the contents to ferment. Care is necessary during fermentation to ensure that the seed does not become discoloured. Actually, the germinating quality of stained seed is not impaired, and while it is quite suitable for a grower's own use, its selling value is lessened. During fermentation, therefore, the pulp should be stirred frequently. It has been stated that if the juice and seed of a number of very ripe or over-ripe cucumbers is added to the contents of the containers, a yeast ferment is set up and that this ensures a better coloured seed than the seed fermented by moulds. Each grower should gauge for himself when his ferment is ready to wash, so that the seeds are readily separated from the flesh. In a yeast ferment, 24 hours may be sufficient. On the other hand, a mould ferment may require three days or longer. The viability of the seed is not impaired by allowing it to remain in its own juice for up to six days.

The washing of the fermented seed is an easy matter, as most of the seed sinks to the bottom of the container and the pulp may be floated off. It is then only necessary to place the seed in a sieve and give it a final washing with clean water.

The seed should be dried as rapidly as possible to avoid staining. It is best to spread it out in the sun in a very thin layer on a calico sheet or piece of hessian and to keep it stirred frequently until dry. It should then be spread out under cover for about a week before being bagged.

One bushel of fruit yields, when scraped, about 1 gallon of juice, seeds, and pulp; and after fermentation and washing, about ½ lb. of seed will be obtained. Production from an acre of vines is stated to average 200 lb. of selected seed.

Tomato Seed.

The selection of tomato seed is very important for the production of bigger crops of good quality fruit. In going through his tomato patch, a grower should mark plants showing exceptional vigour and which are carrying heavy crops of fruit of good shape.

The fruit on these plants should be allowed to ripen to a complete red maturity before being picked. They should then be squeezed into suitable vessels—wooden for preference, although kerosene tins or galvanised buckets will serve—and set aside in a shed for from four to six days to ferment. Water should not be added to the fresh pulp.

After fermentation, wash the pulp in clean water several times and it will be found that the pulp will float off, leaving the clean seed in the bottom of the vessel. The seed should then be thinly spread out on a piece of calico or clean hessian and dried in the shade. If the seed when dry tends to stick together, it will separate easily when rubbed between the hands.

Ordinarily a half bushel of tomatoes will yield 1 oz. of seed, which will produce approximately 2,000 plants.

French Bean Seed.

The method of saving French bean seed does not need lengthy explanation, as it suggests itself. A section of the bean patch which has good growth and is free of disease should be reserved and not picked, except perhaps for a first picking. The plants should then be allowed to carry a crop to complete maturity, which is indicated by the bean pods turning brown and becoming dry. Before the pods have dried sufficiently to crack and permit the seed to fall to the ground, the whole plants should be pulled and bagged and taken to a shed where the seed can be freed by spreading the plants on a tarpaulin or board floor and beating with a light board. The old plants can then be raked and removed, leaving only the seed and smaller trash. The trash can usually be easily removed by dropping the seed from a height of several feet when a strong wind is blowing. The trash will be blown away, leaving the seed clean. If by chance the pods become too dry to handle without great loss of seed, it is advisable to cut the plants early in the morning when the dew is on them. The bean pods are then less brittle and a great deal more seed can be saved. The plants should, however, be spread out on a tarpaulin in the sun to dry if harvested while damp.

Lettuce Seed.

Lettuce for seed production should be planted during late winter, so that seed will be harvested during the spring or early summer months.

At the outset the plants should be grown similarly to lettuce for the market, allowing 12 inches between plants and 2 feet between rows. Superphosphate should be used for side dressings, however, instead of sulphate of ammonia.

Eventually the heads should be thinned out to about 2 feet apart for seed production, leaving only heads which are healthy and true to type in every respect, though they need not necessarily have large hearts. It is the experience of local seed growers that locally produced lettuce seed being acclimatised gives better results than imported seed.

After the plants have hearted they should not be given too much water. Dry or semi-dry conditions will force them into seed more

quickly. In the case of plants with firm close heads it is advisable to slash deeply across the top of the heads to facilitate the emergence of the flower stalks.

The flowers are yellow, and after pollination and seed formation they have a fluffy appearance and resemble the flowers of the common milk thistle. The seed ripens unevenly, and if the plants are left too long in the ground much of the seed is lost through shattering. Therefore, when the first seed begins to shatter the plants should be cut at ground level and hung or stacked over a tarpaulin in a shed. Most of the seed is thus enabled to mature and excessive loss through shattering is avoided.

When thoroughly dry, the seed may be easily threshed by beating the plants with a light flail. The yield averages about 250 lb. of seed per acre.

As lettuce plants readily cross pollinate, only one variety should be grown at a time.

Imperial 847 and Imperial D are two varieties in considerable demand.

Carrot Seed.

For the fresh vegetable market, carrots may be planted at almost any time of the year, but, in the case of those grown for seed production care should be taken to avoid seed harvesting during the wet season, which normally commences in February. With our warmer climate, it is possible to produce seed in ten to eleven months in Queensland. If seed harvesting is to occur about December and January, therefore, the seed for the production of carrot roots would require to be sown, in coastal districts, not later than February. In the Stanthorpe district seed should be sown not later than August, and the seed harvest should occur before the middle of the following year.

Carrots for seed should be grown in the usual way of carrots for the fresh-vegetable market. The seed is sown fairly thickly in shallow drills, the drills being far enough apart to suit the convenience of the grower. If weeding and cultivation are to be done by hand, 15 to 18 inches is a reasonable distance to allow between the drills, but if horse cultivation is to be used, the distance should be about 2 feet 6 inches. After germination of the seed, the young plants should be thinned out to 4 to 6 inches apart. The roots will be mature in about five months. There are two methods which may be employed at this stage for seed production. The first is to remove all the carrots from the soil, select the best formed roots all of the same size, cut off the tops without injuring the crowns, and transplant them to another piece of well-prepared land. The roots may, if desired, be left spread out in a shed for a few days before being transplanted. It is important that the selected roots be all of the same medium size in order that all seed harvesting may be done at the one time. Very large carrots will seed more quickly than smaller roots, and harvesting will be extended. Carrots with broad crowns should not be taken for seed production, as they usually have big cores, and are therefore not of first quality.

At transplanting, the crowns should remain just above soil level. Holes may be made with a dibble and the carrots thrust in and the soil firmed around them, or drills may be opened and the carrots placed in them and the soil drawn up around them.

As the seed heads develop a fair spread, they should be given room. The roots should, therefore, be spaced 12 to 18 inches apart in the rows,

according to the width of the rows. If hand working, 2 feet is a reasonable distance between rows, while 2 feet 6 inches should be allowed for horse cultivation. In some instances, the roots are set 30 inches by 30 inches apart to allow horse cultivation both ways. The rate of seed production per acre, however, is reduced by wide spacing. If the weather is dry the roots will require irrigating after transplanting, but over-watering should be avoided or the roots may commence to rot. At all times the carrots for transplanting should be carefully handled. They should not be thrown about or bruised in any way. Sometimes severe loss of roots occurs after transplanting, through rotting. This can be offset to some extent by transplanting before the carrots are fully matured.

The second method which may be employed for producing seed avoids transplanting. The carrots are grown in rows in the usual way and when mature are thinned out leaving one, about every 12 inches in the rows, to go to seed, without being disturbed The thinnings are, of course, marketed, or they may be transplanted to new ground.

A drawback to the second method is that the grower cannot be sure that the roots left in the ground for seed are well-formed carrots. He will, however, be able to get a good idea of the quality of the roots in general by carefully observing the thinnings. If most of these are good carrots, he may take it for granted that the balance left in the ground for seed will also be generally good. If, however, there is a big percentage of malformed and poor type roots amongst the thinnings it would be preferable for him to adopt the transplanting method and select his roots.

It is estimated that seed will be ready to harvest in about five months from maturity or transplanting of the roots.

When growing carrots for seed, it is important from the period of maturity or transplanting of the roots onwards that no other variety of carrot be grown for seed within at least a mile of the plot, because when the seed head is produced from the root the flowers will readily cross-pollinate with other varieties and the resultant seed will be a cross. This also applies to the wild carrot which is a common weed in some localities and which should be destroyed in the vicinity of the seed plot.

Carrot seed does not all ripen together, and at the period of maturity should be frequently inspected. If it is left to mature too long, some seed will fall and be lost. On small areas, the seed clusters may be harvested as they ripen over a period of two or three weeks. On larger areas, the whole crop may be harvested when most of the seed clusters are mature. The whole plants are cut in this case and placed in heaps for a week or two to dry. The seed heads are then chopped off and spread out thinly on a clean closely-boarded floor or tarpaulin to dry further, when the seed can be extracted by beating the heads with a light board. Experience has shown that carrot seed is easily threshed on a hot dry day, but is difficult to remove from the seed heads if the weather is dull and damp. To thoroughly clean it of all small sticks and rubbish, carrot seed needs to be sieved through several screens of varying mesh. Thorough cleaning is not, however, necessary when a grower is saving seed for his own use.

An acre of carrots has been stated to produce an average yield of 350 lb. of seed, but this is dependent on the distance apart the roots are grown which, of course, means the number of carrots grown to the acre. If the roots are grown 18 inches apart in rows spaced 3 feet, there will be

9,680 carrots in the acre. The average production from these would require to be about nine-sixteenths, or just over half an ounce of seed per plant to give 350 lb. In practice, it has been found that a percentage of the roots do not go to seed, while on the other hand, some plants have produced recently one and a-half and up to two ounces of seed each.

Cabbage Seed.

Cabbage seed is not of high quality when produced under hot coastal conditions which cause the varieties to deteriorate. However, some enquiries have been received from the Stanthorpe district regarding cabbage seed production, and as that district should produce seed of reasonable quality, a few hints are appended:—

1. Cabbage is subject to ready cross pollination from other members of the Brassica family viz:—brussels sprouts, swede turnip, cauliflowers, etc., and none of these plants should be grown near the cabbages selected for seeding.

2. Normally, seed is best when harvested during the spring and early summer months. Therefore planting should be done in time for the main crop of cabbage to be matured and ready for market during middle to late winter. However, in the Stanthorpe district, plants set out in the very early spring to produce seed in the late summer or autumn would be worth a trial.

3. Even with careful selection of plants, there is likely to be some throwback in the seed, and it is best to make selections each season.

4. Select only uniform, medium-sized plants for best results. Outstanding plants rarely breed true to type.

5. After selecting desirable heads, strip off the outside leaves and dig the plants up, retaining as many roots as possible, and transplant them to an isolated position where there is no risk of cross pollination. When the plants are well rooted, slash the heads across the top to weaken the leaves and allow the seed heads to push through. When the seed heads are in full flower the bottom heart leaves can be stripped from the plants.

6. Keep the plants sprayed against pests.

7. The seed is ready to harvest when the pods crack at the slightest pressure of the fingers. If allowed to remain too long, the pods will open on the plants and most of the seed will be lost.

8. Cut the whole of the plants at the correct stage of seed maturity, and hang them up in an airy shed (with a tarpaulin under them) and allow them to dry thoroughly. During this process much of the seed will fall, but will be caught by the tarpaulin. When the plants are quite dry, shake out the rest of the seed and place it in a hessian or cheese cloth bag, which should be hung up in a dry, airy place, such as under the house. Do not store too close to a galvanised iron roof. Disinfection is not necessary and the seed will keep good until the following year. A single plant will yield an average of 3 oz. of seed.

9. A second method of seed production is to mark selected plants and, after the heads of these have been cut for market, to dig up and transplant the stumps. These, later, will throw seed heads which are treated as described.

Cucumber Growing.

C. N. MORGAN, Fruit Branch.

CUCUMBERS grow very well in Queensland. The vines like warm growing conditions though very hot weather tends to burn and consequently defoliate the plants, exposing the cucumber fruits, and thereby rendering them liable to sunburn. Frost will kill the vines and they should therefore not be grown during winter on low lying land.

The main planting is carried out in southern coastal districts during the months of July, August and September, and a further sowing is made during February and March in areas not subject to frost. On the Tablelands, as for instance, Stanthorpe, seed may be sown from September to January, whilst in northern coastal districts seed may be sown throughout the year except during the very hot months.

Like most other vegetable crops, cucumbers require to be grown quickly in order to obtain good crops of crisp tender fruit. On land which is not over fertile, five (5) to six (6) cwt. of a quick acting commercial mixture should be used as a base dressing, followed by a side dressing at the rate of two (2) or three (3) cwt. of a similar quick acting fertiliser, just before the plants commence to run. If using land which has just grown a winter crop, say of cabbage, which has been heavily fertilised, then it is only necessary to use half the quantity of fertiliser. All that would be necessary in this case, would be to apply fertiliser along the rows where the cabbages have been removed, scuffle the area well a couple of times, open shallow drills and sow the seed. Seeds should be sown sufficiently thick in the drills so that when large enough the young plants may be thinned out to one about 18 inches to 2 feet apart. When sown close together in this manner, the vines cover the ground quickly, affording protection, and additionally they usually fruit earlier. When grown in rows approximately 3 feet apart, and spacing the plants as above, 2 lb. of seed should be sufficent to plant an acre.

Another method of planting is in what are known as "pits" or "hills." These terms are used to represent groups of three or four plants. At one time, the seed was sown always on small hills of soil formed by throwing together two or three shovelsful of soil, hence the name "hills." Unless, however, the land is inclined to be wet there is no need to follow this practice. The idea of planting in "pits" or "hills" is to fertilise small patches of ground about four (4) feet apart, and to sow several seeds in each, about a inch below the surface. About four (4) plants are allowed to grow from each "hill."

Should the vines send out their runners to a distance of two or three feet without setting any cucumbers, fruiting may often be assisted by pinching off the tips of the runners.

Vines of all descriptions are particularly subject to damage from heavy winds. If the site is exposed therefore it is well to provide a breakwind of some kind. This applies more especially with an early crop sown say in July, which might be exposed to the westerlies, usually experienced in August. A little thought on the part of the grower will soon overcome this problem. For example, thickly sown rows of a quick growing crop such as saccaline grown early in the year

at say half a chain intervals, and allowed to remain for the cucumber crop, will effect a surprising amount of shelter from winds. If the breakwind tends to grow too high, and to shade the vines, it can easily be lopped back with a reaping hook to a height of about thirty (30) inches. It is desirable to have rows running north and south for the early crop to obtain maximum sun and protection.

Cucumbers usually take about three (3) months from seed sowing to harvesting. The fruit should be picked when nearly full grown, before the seeds harden, and the skin begins to turn yellow.

Varieties recommended are Early Fortune, Kirby's Stay Green, Black Diamond and White Spine.

Plate 20.

A "Dig for Victory" Vegetable Garden in a Brisbane Suburb.—A group of girls employed in city offices, undaunted by the natural poverty and steep slope of the allotment, established a systematic layout providing for controlled drainage and the prevention of erosion. Continuity of production of salad vegetables has been maintained from season to season. Several "Dig for Victory" groups have established productive vegetable gardens in suburbs of Brisbane with the aim of supplying sick and convalescent Diggers with garden-fresh green vegetables continuously, and have succeeded so well that, in the aggregate, produce to the value of many hundreds of pounds have been supplied to military hospitals as a practical spare-time contribution to the national war effort.

APPLIED BOTANY

Edible Trees and Shrubs.

I. The Brown Kurrajong.*

W. D. FRANCIS, Botanist.

THE Brown Kurrajong is most commonly seen as a shrub or small tree in the regrowth of felled scrub or rain forest. It attains a height of about 40 feet and a stem diameter of about 1 foot. The seedlings generally come up in very large numbers after the scrub fire.

It is allied to the common Kurrajong† and the Bottle Tree‡, which are more common in inland parts of the State. These three important native fodder trees belong to the same plant family.§

The shrubs and young trees have a brown bark, the surface of which is marked by pale spots.‖ The bark is also very fibrous, and long strips of it can be removed from the stem and branches. The leaves are placed alternately on the branchlets The leaves are attached by a stalk ⅜-¾ inch long. The leaf blades are egg-shaped or heart-shaped in outline, broad and often indented and unequal-sided at the base, the margins mostly toothed, underside pale and finely hairy. The leaf blades measure from 3 to 6 inches long and one and a-half times to twice as long as broad. The inflorescences are mostly situated on the branchlets opposite to the insertion of the leaf stalks. The flowers are white, and each measures about ¼ inch diameter when expanded. The flowers mature into a round capsule measuring ¾-1 inch diameter, including the ¼ inch long soft projections which cover it.

The Brown Kurrajong is widely spread in the coastal area from the New South Wales border to Cape York Peninsula. It does not penetrate inland far beyond about 100 miles. It is also found in New Guinea, the East Indies, and the Pacific Islands.

Stock are very fond of the leaves and young twigs. The partiality of cattle is well shown by the way in which they break down the tall shrubs and young trees in order to get at the leaves.

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* *Commersonia bartramia* (synonym *C. echinata*).
† *Brachychiton diversifolium.*
‡ *Brachychiton rupestre.*
§ *Sterculiaceae.*
‖ *Lenticels.*

Plate 21.

The Brown Kurrajong Flowering Twig and Fruits.

ANSWERS.

Selections from the Government Botanist's outward mail.

Trees Suitable for the Lowood District.

Cape Chestnut, Crow's Ash, Moreton Bay Chestnut, Camphor Laurel, Jacaranda, Insignis Pine, Kurrajong, Pepper Tree, White Cedar, Lemon-scented Gum. Most are obtainable through ordinary commercial channels or from the City Council Nursery.

Trees for the Goondiwindi District.

Bottle Tree (narrow-leaved variety), Kurrajong, Native Bauhinia, Sugar Gum, Scented Gum, Tristania or Lophostemon, Pittosporum, Portuguese Elm, Olive, Camphor Laurel, Pepper Tree, White Cedar, Cape Chestnut, Jacaranda (requires protection in early growth), and Pines (as recommended by the Forestry Department).

Quinine Berry.

M.L.K. (El Arish, N.Q.)—

The specimens from Dimbula are of the Quinine Berry, the same as the Georgetown berries. Neither is a satisfactory substitute for quinine. At present the Physiology Department of the Queensland University is working on the Leichhardt Tree. This tree belongs to the same family as the Quinine Berry and the bark is used in North Queensland by bushmen as a reputed cure for malaria and other fevers.

PLANT PROTECTION

The Potato Flea Beetle.

A. R. BRIMBLECOMBE, Assistant Research Officer.

AN outbreak of the potato flea beetle caused serious losses in the 1943 autumn crop in the Lockyer and South Burnett districts. This insect was first recorded from potatoes in Queensland in June, 1896, near Beaudesert, and has since been collected at other centres along the east coast as far north as the Atherton Tableland. Although the beetles occur in potato crops almost every year, serious damage was last recorded in 1916 and crops are normally produced without any safeguards against this pest. Consequently, in the autumn of 1943, flowering was in progress before the damage became apparent.

Life-cycle Stages and Habits.

The life-cycle of the potato flea beetle includes the usual four stages —namely, egg, larva, pupa, and adult. The adult (Plate 22; fig. 4) is a shining, metallic-blue, oval-shaped beetle measuring about an eighth of an inch in length. The rather stout hind legs enable the insect to leap considerable distances when disturbed, hence the name, flea beetle.

The eggs (Plate 22; fig. 1) are pale-yellow in colour, oval in shape, and about a fortieth of an inch in length. They are laid singly or in groups among the hairs in the grooves on the upper surface of the leaf stalks and in cracks and abrasions on the stems.

The full-grown larva (Plate 22; fig. 2) is elongate, cylindrical, almost half an inch in length, and pale-cream in colour, with a brown head. It can be readily separated from the larva of the potato tuber moth, which also attacks the stems, by the absence of (*a*) the black colouring on the segment just behind the head and (*b*) the short caterpillar legs on the abdominal segments, which are typical of the latter insect. When the flea beetle grub is full grown, it leaves the plant, enters the soil, and constructs a small earthen cell, in which it later changes to a pale-cream coloured pupa (Plate 22; fig. 3). The adult beetle subsequently emerges from this pupa and makes its way to the surface of the soil.

Details of the life-cycle of the potato flea beetle are not yet available, and it is assumed that the period required for the completion of its development is comparable to that of similar insects elsewhere. If this is so, a single generation will extend over about two months during the summer and a much longer period in the winter.

Nature and Extent of Damage.

The potato plant is damaged by both the adult and larval stages of the flea beetle. The adults feed on the upper surface of the foliage, eating small, irregularly-shaped holes in the leaves (Plate 23). When

they are present in large numbers they reduce the amount of foliage and possibly affect the yield of tubers; even so, a payable crop is usually obtained. Damage by the larvæ, however, is far more serious, because, on emerging from the eggs, they bore into the stems. At first they tunnel in the soft outer tissue, but as they grow larger they prefer to tunnel in or near the harder tissue through which food supplies are transported in the plant. Larvae arising from eggs laid on young plants enter the stem at or near ground level and work downwards into the root. Later in the season, attacks occur elsewhere on the stem. The beetles can apparently live for a long time, and egg-laying may therefore be spread over several weeks during which the larval population in the stem steadily increases. The damage at or near ground level is particularly serious, for it is here that food supplies pass from the roots to the leaves and from the leaves to the tubers. The damage inflicted not only interrupts the flow of these foods but also allows the entry of rot organisms; these are associated with a severe wilt when the plants are flowering from which they seldom recover.

Attacks may commence in a portion of the field which is adjacent to areas that have provided shelter for the beetles. However, they are capable of flying, and it is not unusual for the damage to be evenly distributed throughout the whole crop. Besides potatoes the flea beetles feed on the foliage of tomatoes, egg-plant, and several related weeds. One of these, the black berried nightshade, often occurs in potato fields and is the only other plant in which the larvae have been found.

Some growers consider that the recent extensive development of irrigation may have contributed to the flea beetle attack in 1943. The most severe damage has certainly occurred on irrigated crops, but non-irrigated areas have also suffered considerably. Differences in the amount of damage were also apparent between varieties of potatoes on individual farms, but these were not consistent from farm to farm. Plant-

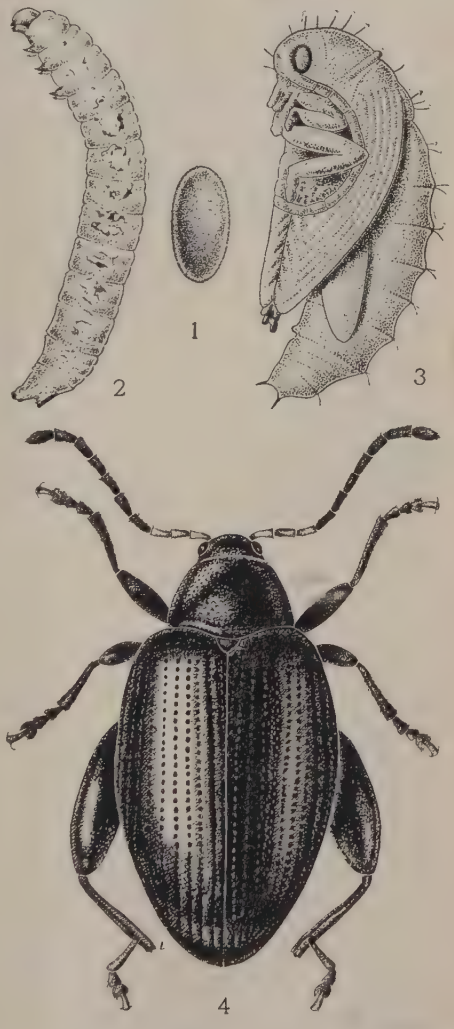


Plate 22.

Potato Flea Beetle: Fig. 1—egg × 20; fig. 2—larva × 6; fig. 3—pupa × 11; fig. 4—adult × 20. *Drawings by William Manley.*

ing dates did, however, appear to affect the amount of loss sustained by the grower. Crops planted in January were almost wiped out; those planted in early February suffered more than those planted late in the month, and March plantings almost completely escaped damage.

Plate 23.
POTATO FOLIAGE DAMAGED BY FLEA BEETLE ATTACK.

Control.

Normally the damage does not extend beyond that caused by the adult beetles, against which control measures have so far been unnecessary. For this reason a control programme for outbreaks in which the larvae are mainly responsible for the damage cannot at present be recommended. Pending the results of experimental work, arrangements for which have been made in this year's spring crop, growers who wish to do so may spray their crops with lead arsenate prepared by adding 3 lb. of lead arsenate to 100 gallons of water. This treatment will have no effect on the larvae once they have become established in the stems, but it should exercise some control over the adult beetles and young larvae recently emerged from the eggs. Treatment should only be applied if the beetles are seen on the plants, and spraying at seven to ten days' intervals, so long as they are present, may meet requirements.

Home-Made Cuprous Oxide Mixture.

F. W. BLACKFORD, Assistant Research Officer.

HOME-MADE cuprous oxide mixture, previously known to many farmers and orchardists under the somewhat less accurate name of colloidal copper, is rapidly proving a very useful substitute for Bordeaux mixture as a fungicidal spray. In experiments it has proved as efficient as Bordeaux mixture for the control of all fungous diseases so far dealt with, and in the case of some crops, such as citrus and tomatoes, it has the added advantage that it does not materially adversely affect plant growth. Owing to the comparatively recent introduction of this spray, opportunities have not been obtained for testing its adaptability to all crops on which Bordeaux mixture is normally used. Growers are therefore advised to try the spray on a small scale at first when the crop reactions to the new spray are unknown.

Formula.

The spray consists of a stock solution which is allowed to age and is diluted, as required, to the concentration recommended. The stock solution is prepared from solutions A and B, according to the following formula:—

Solution A.		*Solution B.*	
Bluestone (copper sulphate)	3 lb.	Caustic soda	15 oz.
Molasses	3 pints	Water	9 pints
Water	12 pints		

The above formula will make up 3 gallons of stock solution. The formula for the spray has been so calculated as to obtain a neutral or very slightly alkaline solution. This is one of the factors which most probably account for the reduction in the injurious effects on the crop when this spray is compared with Bordeaux mixture, which is extremely alkaline. Acid sprays are dangerous, as a burn is likely to follow their application, and highly alkaline sprays have a detrimental effect on crop growth. Testing the mixture with litmus paper is not possible, owing to the heavy nature of the precipitate, but phenolphthalein may be used. This is readily procurable from practically any local chemist; a $\frac{1}{2}$ oz. of it is dissolved in 1 pint of methylated spirits. Pieces of blotting paper are thoroughly wetted with this solution and then allowed to dry. The paper is then cut into strips approximately 1 inch by $\frac{3}{8}$ inch, and these are used for testing the spray. The paper as prepared is white, and if the mixture is too acid—i.e., if an excess of bluestone is present, it remains white. A satisfactory mixture turns the paper a pink colour, but if an excessive amount of caustic soda is present it shows a definite red colour. The phenolphthalein-methylated spirits solution does not deteriorate. The following precautions should be observed in order to obtain a satisfactory mixture:—Accurate weighing; the use of fresh caustic soda; the discarding of caustic soda which has absorbed water from the air and formed hard cakes; and after using, the resealing of the tin of caustic soda so as to render it airtight, thus keeping the soda in good condition.

Bluestone may be obtained as coarse crystals or as smaller crystals known as fines. For the sake of ease in dissolving, the fines are to be preferred. Caustic soda may be obtained in the powdered form or as flakes. The latter is preferable, as it is easier to detect whether the flakes have been affected by being exposed to the air.

The cost of the cuprous oxide mixture exceeds only slightly that of Bordeaux mixture of a comparable strength of copper sulphate, being approximately only 3d. more per 40 gallons of spray.

Preparation of Stock Solution.

The bluestone should be dissolved in the required amount of water, and as this will take some time if cold water is used, it is preferable to use boiling water. The bluestone crystals are placed in a piece of sacking and agitated in the hot water. A wooden barrel is the most suitable container for holding this solution, as iron is corroded by it; iron drums well coated with pitch will serve as a makeshift. When the solution is cool, the molasses is added and it is well stirred until thoroughly mixed.

The caustic soda is then dissolved in the required amount of water. A kerosene tin will serve for this purpose. The soda should be added to the water already in the tin, as, if the water is poured on the soda, there is a tendency for a part of the soda to form a solid cake, which is slow to dissolve. The solution will become quite hot during the process of dissolving.

When cool, the caustic soda solution—i.e., solution B, is added to the bluestone-molasses solution—i.e., solution A, stirring vigorously the while. At first stirring is easy, but in time the mixture thickens and stirring becomes difficult. Stirring is continued until the mixture is once more comparatively easy to stir.

The depth of the mixture is marked on a wooden rod and the solution is then covered to prevent excessive evaporation. The solution is allowed to stand at least a week or preferably longer before using, when the colour will have changed from dirty green to yellowish. It is a good plan to give the mixture an occasional stirring during this period.

Before using this stock solution, any water lost by evaporation, as shown by the marked rod, should be replaced, preferably by rain water, and the solution should then be well stirred. It is often found that a fungus has formed a thick blue-green layer on the surface. This does not affect the spray in any way, but should be lifted out, as it causes clogging of the spray nozzles. The mixture will remain in good condition for a long period, providing it is not allowed to dry out. A batch twelve months old on examination appeared in quite good condition.

Dilutions for Spraying.

(1) Tobacco seedlings—3 pints stock solution to 10 gallons of water.

(2) Tomato—

(*a*) Seedlings—4 pints stock solution to 10 gallons of water.

(*b*) Older plants—4 gallons stock solution to 40 gallons of water.

(3) Citrus—3 gallons stock solution to 40 gallons of water.

Preliminary investigations have suggested that a spray of half the above recommended strength—i.e., 3 gallons to 80 gallons, may be satisfactory for the control of citrus diseases. When substituting for Bordeaux mixture, a good indication of the strength to use is the number of pounds of bluestone in the Bordeaux mixture. Thus, if a 3-2-40 strength Bordeaux mixture was used previously, 3 gallons of the stock solution are added to 40 gallons of water when cuprous oxide mixture is used.

Spreaders.

In the case of citrus and tomatoes, no benefit of practical importance has been obtained by mixing spreaders with this spray. When it is used on tobacco seedlings, however, genuine potash soft soap may be added as a spreader and can be used at the rate of 2 lb. of the soap to 40 gallons of the spray. The best procedure is to dissolve the soap separately in a small portion of the water, which has been set aside for that purpose, the water being heated if necessary. This soap solution is then added to the rest of the spray, the spray being pumped back into itself to obtain a good frothy mixture; as an alternative to pumping, the mixture may be stirred briskly. Proprietary spreaders, such as Agral, may also be used with this spray.

Combination Sprays and Compatibility.

Lead Arsenate.

Lead arsenate may be combined with cuprous oxide mixture for combating fungous diseases and chewing insects. The lead arsenate should be mixed to a cream with water and added to the prepared spray. Excess caustic soda will liberate arsenic in solution, and this may lead to injury to the plant tissue; therefore the directions discussed under the heading of "Formula" should be followed closely when using this combination. Soap should not be added to this mixture.

Fumigation.

The effects of the fumigation of citrus trees with calcium cyanide *after* the use of cuprous oxide mixture have not yet been fully investigated. However, experiments show that from 5 to 6 inches of rain must fall after a spray of the 3-40 strength has been applied before fumigation with calcium cyanide may be considered safe. If the 3-80 strength were used, from 2 to 3 inches of rain would be sufficient. Fumigation *before* spraying with the cuprous oxide mixture is quite safe, though it is considered best to allow an interval of a week to ten days between treatments.

Zinc Sulphate Sprays.

For the control of mottle leaf of citrus, a zinc sulphate-hydrated lime spray made up according to the 4-2-40 formula is recommended. Cuprous oxide mixture may be added to this spray at the usual strengths. Where spraying for insect control is practised, it would be quite safe to apply the zinc sulphate-hydrated lime and cuprous oxide combination. Caution, however, should be exercised in its use if insect pests are controlled by fumigation.

It has been suggested that the presence of hydrated lime in a mixture may be a factor contributing to injury by fumigation following the use of certain copper sprays. Hence the use of a cuprous oxide-zinc sulphate-hydrated lime combination may predispose the trees to fumigation injury. However, experiments have shown that caustic soda may be substituted for hydrated lime in this combined spray at the rate of $4\frac{1}{2}$ oz. to 1 lb. zinc sulphate, thus eliminating the undesirable factor. Care should be taken to weigh out the amount of caustic soda quickly and accurately, as correct weight is necessary to obtain the neutral mixture required. In any case, it would be wise to fumigate cautiously after such a mixture until more is known of the interaction between copper sprays and fumigation.

Lime Sulphur and Colloidal Sulphur.

Copper sprays should not be mixed with lime sulphur, as a reaction occurs between the copper and the calcium poly-sulphides in the lime sulphur, resulting in the formation of a dirty grey precipitate of sulphides of copper and sulphur. While no harm would result from spraying a crop with such a mixture, the efficiency of both sprays is impaired. Where a sulphur and copper combination is desirable, e.g., for the control of mites and target spot in tomatoes, commercial colloidal sulphurs may be mixed with home-made cuprous oxide.

An application of a strong lime sulphur spray during late winter is recommended for the control of white louse on citrus, and cuprous oxide mixture is first applied for disease control in spring when one-half to three-quarters of the petals have fallen. This application of copper may follow that of the strong lime sulphur after an interval of a week or more. The reverse order, copper followed by the lime sulphur, though not likely to be used, is not recommended, as reactions similar to those occurring when the sprays are mixed will take place on the leaves. When, however, later in the season, the weaker strength of lime sulphur is used for the control of Maori mite, this effect is not so serious and the lime sulphur may follow the copper spray.

Colloidal sulphur may be used prior to, or following the copper application without any detriment to the efficiency of either spray.

Soap, Oil, &c.

Although the use of a cuprous oxide-soft soap combination has met with success in the control of blue mould of tobacco, it is not generally recommended to mix soap with cuprous oxide. If white oil is to be added to cuprous oxide for the control of scale insects on citrus, the addition of soap should definitely be avoided because the molasses used in preparing the cuprous oxide contains lime and other salts, and these will react with the soap to form an insoluble curd. If white oil is then added the emulsion is destroyed and free oil rises to the surface carrying with it the insoluble curd formed from the soap, resulting in a thick paint-like scum. The free oil would cause severe burning. To overcome this difficulty, the following formula for an alternative cuprous oxide mixture has been devised for use in cases where it is necessary to mix cuprous oxide with the sprays mentioned in the following paragraph:—

Solution A.		*Solution B.*	
Bluestone	3 lb.	Caustic soda	15 oz.
Honey	½ pint	Water	9 pints
Water	14½ pints		

Third-grade honey is quite suitable for use in this mixture, and the increased cost over the molasses formula on page 97 is very small, approximately ¼d. per 40 gallons of spray.

The solutions are mixed and allowed to age in exactly the same fashion as described on page 98. This mixture may be combined with soap or any of the citrus scalicides, soap-washing soda, soap-washing soda-white oil, white oil or resin-caustic soda-fish oil, where the control of both scales and fungous diseases is desired. To prepare the combination spray, the scalicide is made up according to the usual formula and then the cuprous oxide mixture (using the honey formula) is added at the rate of 3 gallons of stock solution to 40 gallons of spray or 3 gallons to 80 gallons if the weaker strength is used, stirring briskly.

Nicotine Sulphate.

For the control of soft-bodied insects and fungous diseases, nicotine sulphate may be added to cuprous oxide mixture at the usual strengths. As, however, it is usual to add soap to liberate the nicotine, it would be perferable to use the honey formula for the cuprous oxide mixture.

Commercial Preparations.

Cuprous oxide is also being marketed commercially. The material, which is in powder form, mixed with a wetting, spreading, and sticking agent, may be stirred into the required amount of water and used as a spray. It can be applied wherever the home-made spray is recommended, except in the case of citrus, when fumigation is practised for pest control. As the spray sticks so well and also because of the chemical composition, it is advisable to rely on the home-made mixture for use on citrus fumigated for pest control.

Copper oxychloride and basic copper sulphate are also sold as powders for use as sprays. A limited amount of work on tomatoes has shown these to give quite effective control of disease and to possess the several advantages of home-made cuprous oxide mixture. However, where citrus trees are fumigated for insect pest control, these sprays are not recommended owing to the possibility of the trees being rendered liable to injury.

Plate 24.

Tobacco Seed-beds Designed for Benzol Treatment.—When benzol is being evaporated for the control of blue mould, the calico covers shown to the left of the beds are stretched over the wooden framework.

Merino Flocks.

J. L. HODGE, Instructor in Sheep and Wool.

AT the present time Queensland is carrying well over 25,000,000 sheep, a record number for the State. When it is realised that of this number 98 per cent. are of the merino breed, it will be recognised what an important influence this breed has on the pastoral economy of the State.

To attain a full measure of success with a merino flock, it is imperative that the right type of sheep should be chosen for the country grazed. For instance, it would be definitely wrong to introduce the finest of merinos to our far distant Western lands where periodic droughts occur and there are often considerable distances for sheep to walk to water. On this class of country a more robust type of merino, strong in constitution, and one more or less able to forage for itself is required. The character of the country, then, should be carefully considered before deciding on the merino type most likely to be successful.

Establishing a Flock.

An opinion on the purchase of station-culled young ewes, as against breeding ewes culled for age from the same property, is often sought. Apart from price considerations, it is said unhesitatingly that the breeders are the better purchase and probably much less costly. This applies especially where it is the practice to sell culled-for-age ewes each year. The point is that the station practising culling, as a matter of policy, would never have kept the ewes unless they were well worth while. Then, again, they may not be too old. In the case of the young culls, it is very evident that they were thrown out for some fault. Then why should the new owners perpetuate the fault by breeding indiscriminately from them? Some young culls may be far better than others, but in any culled flock these again want careful examination before being admitted as breeders.

To carefully select the ewe flock is only one end of the business. The choice of rams to suit the particular type of ewe is of the utmost importance. Where a blood line has been successfully established in a particular locality, and ewes of this line are being used, it is a good plan to stick to this strain when choosing rams. This does not necessarily mean a choice from the same stud. Out of this blood line must then be chosen the type required. It is too common a practice for a ram breeder, when selling to a client, to yard a certain number of rams, and to give the purchaser a run of the number required out of the total

yarded. This is evidently wrong from the breeder's point of view. Although the rams themselves may be all right, and quite suitable as sires elsewhere, it is quite possible that a number of the run should never see the ewes. Had the ram breeder typed his rams into fine, medium, and strong, then the purchaser has the opportunity of getting, not only the blood he wants, but the type and the blood.

Queensland rams have been greatly improved in the last few years, and a breeder should be able to satisfactorily fill his requirements from some flock in this State. The matter of the right rams to "nick" a particular flock is so important that the breeder, if he lacks the necessary knowledge to select his own rams, would be well advised to pay a man of recognised ability to make the selection for him. Under average conditions or worse, a flock in Western Queensland tends to run out and become finer. Therefore, it is necessary in selecting rams to choose those slightly broader in the fibre than the ewes with which they are to be mated.

Provided the right rams are selected, the price, within common sense limits, is of secondary importance. The purchase price shoud be regarded as an economy rather than as an extra expense. Three guineas a head may be wasted money, while £5 5s. a head may be cheap. After all, what is aimed at in the progeny is the return they will give per head rather than the figure realised per lb.

Other Points in Flock Management.

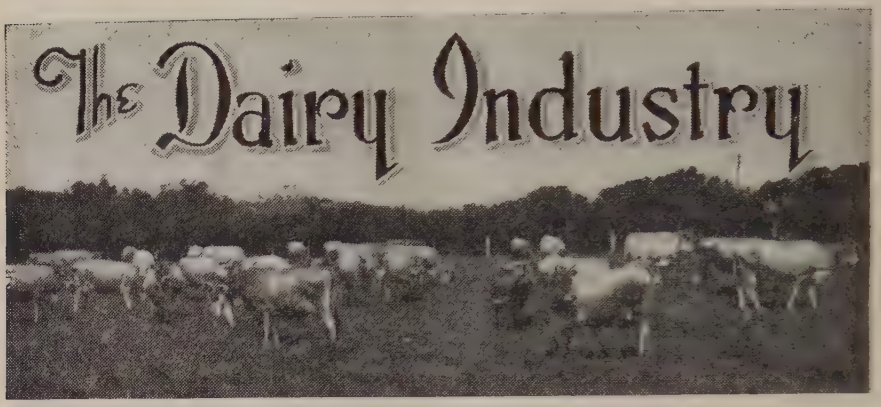
Conformation in merino sheep should receive more attention than is usually given to it. The covering is, of course, of the utmost importance, but not everything as some growers seem to think. The maintenance of the health and condition of the flock is a prime necessity, if satisfactory wool returns are to be expected. A thousand well-fed sheep will return just as much as 1,500 half-starved sheep.

There is not, speaking generally, sufficient done in the matter of change of pasture. Too often one sees sheep shorn, put into a paddock, and left there for long intervals.

The choice of mating time should be governed by experience in the particular locality. A time chosen for one district may prove unsatisfactory in another. Blowfly attacks, too, have to some considerable extent influenced graziers in the choice of a suitable time for lambing.

At weaning time the young sheep should have the best grazing on the property. From weaning time to eighteen months old is the most tender age of a sheep. To attain proper growth and development, the young sheep must be soundly nourished. Above all, never wean into a seedy paddock.

If weaners are shorn as such, allow as nearly a full growth of wool as possible before the job of culling the young ewes is undertaken.



Cream Defects—Probable Causes and Prevention.

E. B. RICE, Director of Dairying.

BACTERIA thrive in milk; therefore, every care should be taken to remove or minimise sources of contamination of milk and cream. Probable causes of defects in cream and means and methods of prevention are set out as follows:—

Overripe, Sour.—Excessive acidity, due to failure to cool cream; keeping cream too long on the farm or infrequent delivery to factory; use of unclean utensils, separator or milking machine; separating cream at too low a test; careless dairy methods.

Prevention.—Use thoroughly clean and near-sterile utensils; cool cream and keep cool; deliver to factory as frequently as practicable; separate cream at 38-42 test in summer and 34-38 test in winter; stir cream occasionally.

Fermented, Gassy, Yeasty.—General uncleanliness, particularly due to yeasts and gas-forming bacteria; washing separator only once daily; improperly cared for milking machines; wood stirrer; mixing hot and cold cream; dirty yards and bails. Infrequency of delivery and high temperatures aggravate this condition.

Prevention.—Production methods should be carefully revised; remove manure from yard daily; do not use rag strainers or wash-up cloths; use only seamless utensils; clean utensils, clean hands and udders and cooling are the keynote of control.

Unclean, "Off" Flavour, "Tainted."—Faulty shed methods, particularly use of cheese-cloth or rags as strainers instead of cotton-wool filter discs; dirty milking machines; dirty udder cloths; wet-hand milking; imperfectly cleansed utensils; use of cloths for washing-up; dirty wash-water; leaky milk float in separator; unwashed separator; wooden stirrer; dirty manure-laden cowyard; milking machine airline; cows in season.

Prevention.—Milk with clean hands; wash udders; reject cloth strainers and wash-up cloths, and use only brushes; use near-sterile utensils; cool cream; renew perished inflations and rubber tubing; deliver cream frequently to factory; follow advised procedure in cleaning and

steam sterilizing for milking machines; reject abnormal milk from cows in season.

Cheesy.—General insanitation (cheesy cream is always graded second or rejected); straining milk or cream through cheese-cloth; unclean machines. High temperature and infrequency of delivery will accentuate this defect.

Prevention.—A complete overhaul of shed practices is indicated; avoid cheese-cloth strainers and use cotton filter discs; keep brushware clean by washing and drying; use only seamless utensils.

Rancid.—Result of advanced undesirable bacterial fermentation; cream is low second grade or reject quality.

Prevention.—Same methods as for cheesy defect apply.

Metallic.—Holding cream in vessels, the tinning of which is imperfect; rusty utensils; pitted milking machine pipelines; using kerosene tins for buckets.

Prevention.—Have faulty utensils retinned; avoid using rusty, broken or dented utensils; all dairy utensils should be seamless.

Tallowy Oxidised.—Advanced stage of metallic defect; exposure of cream to direct rays of sun; placing cream in cans kept in sun; cream of excessive fat content.

Prevention.—As for metallic defect. Protect cream from the sun's rays; separate cream at 38-42 test in summer and 34-38 test in winter. Stir cream occasionally.

Stale.—Cream kept too long on farm; high temperatures aggravate this defect.

Prevention.—Cooling of cream and frequent delivery to factory; cleanly shed methods.

Ropy.—Result chiefly of bacteria in water supplies, especially in swamps and dams. Cows pick up germs on udders, which later establish themselves in utensils and bails.

Prevention.—Stop access of cows to possible sources of contamination; wipe udders well (chlorine is advised); whitewash bails; clean up yard; thoroughly sterilize utensils and rinse them with chlorine solution (100 p.p.m. is advised).

Curdy.—High acidity caused by holding cream at too high a temperature; failure to blend cream properly; skimming too thin; leaving skimming dishes out of separator bowl; neglect to stir cream.

Prevention.—Separate at 34-38 test in winter, 38-42 test in summer; cool cream; do not mix hot with cold cream; stir cream four times daily.

Cowy.—Unclean bails and yards; milking too soon after calving; milking unhealthy cows; dirty udders and hands; bad drainage.

Prevention.—Strict cleanliness is essential; keep cream in dairy away from bail air and cowyard dust; sweep bails daily.

Albuminous.—Abnormal milk due to cow's physical condition; using cream of freshly calved cows; late lactation cream; cows wading in swamps.

Prevention.—Reject abnormal milk; wash thoroughly udders of cows which have waded in swamps (chlorine solution 100 p.p.m. is advised).

Machine Taint.—Unclean and fat-saturated inflations and rubber tubing; unclean air pipeline and vacuum tank.

Prevention.—Carefully wash and steam-sterilize milking machine; renew inflations and tubes promptly; clean vacuum tanks and airline; hold inflations in weak lime-water between milkings.

Slimy.—Flushing separator bowl with hot water: use of too small separator; unhealthy cows; access to stagnant water: newly calved cows.

Prevention.—Do not flush separator bowl with water; fence cows from stagnant water; reject milk of unhealthy cows.

Cowyard.—This and cowy flavours are alike. Caused by muddy cowyard; bad drainage; smells of manure or bail floor drawn through teat cups; or holding cream in surroundings of dirty cowyard, near drains, smells of pigsties, manure heaps, and calf pens; storing other goods in dairy; general insanitation; often a conglomeration of bad flavours, but none as pronounced as to be distinguished individually.

Prevention.—Take the required precautions during production and after; take care to avoid contamination from the sources indicated. An overhaul of production methods is indicated if the cause is general insanitation.

Bitter.—Often due to something eaten by cows, such as wild convolvulus, quinine plant, thistles, lupins, vetches, and lotus major (when in flower); milk from cows late in lactation: protein-attacking bacteria.

Prevention.—If due to food consumed, graze such pastures immediately after milking and keep cows away from suspected paddocks three hours before milking.

Feed Flavours.—Rank pasture; storage near strong-smelling food like silage, lucerne, clovers (green, and as hay), mouldy or musty hay, green barley, green rye, green cowpeas, turnips, or onions.

Prevention.—If practicable, flavour-tainting feeds should be fed straight after milking; remove cows from such feeds at least three hours before milking. Aeration and cooling tends to diminish feed flavour.

Weedy Flavours.—Common cream-tainting weeds are mustard weed, carrot weed, cress, hexham, pepperwort, lantana, stinking roger, New Zealand spinnach, turkey berry, chillie weed, wild turnip, and penny-royal.

Prevention.—Complete removal of taint cannot be effected even in the factory; hence cream is usually second grade. Aeration and cooling may reduce the intensity of the defect. Pasture management is the only remedy.

Absorbed Flavours.—Caused by absorption of odours from nearby surroundings; engine exhaust fumes; coal tar; oil from engine or on separator block; smoke from dairy fire; paint; vegetables or fruit stored in dairy; kerosene; benzine.

Prevention.—Keep milking shed, separator room and dairy tidy; do not use the shed or dairy for storage of other than milk or cream; lead exhaust away from dairy; and keep strong-selling substances away from cream.

Disinfectant Flavours.—Odorous disinfectants used in shed or for washing cow's teats; handling disinfectants and not washing hands before milking; using salves, carbolic compounds, or other strong disinfectants on cows' udders.

Prevention.—Avoid using carbolic and other odorous disinfectants in the cowshed; carefully follow instructions if chlorine compounds are used in the dairy. (White vaseline and boracic powder make a good ointment, which is non-tainting.)

Cardinal Points in Cream Production.

Healthy, well-fed stock.

Near-sterile utensils.

Abundant and pure water.

Milking clean udders in clean bails; using clean hands.

Cool cream as low as possible, and keep cool.

Frequent delivery of cream to the factory.

Consult the district dairy inspector, who will advise on any cream defect or on other points in dairy practice. Let QUALITY be every dairy farmer's watchword.

DAIRY HERDS DURING WARTIME.

War has placed a serious strain on many dairymen by depriving them of labour, which has naturally resulted in decreased production through compulsory reduction in size of herds, inability to grow supplementary crops and conserve fodder and other circumstances.

Where this reduction has occurred, or is about to occur because of absolute necessity, there is a big responsibility on the farmer to use much discretion in culling the herd.

Where systematic herd testing had previously been practised, little difficulty should be experienced, as the farmer knows the exact production figures of each cow. However, there is a risk in the possibility of "poor" cows, recently calved and in the flush of their production, being retained in the herd at the expense of cows which are very much better, but which at the time of culling, are further spent in their lactation, and are therefore rejected on their present value only.

Then, where there may be no certainty of an assured market after the war for milk from many Queensland districts previously supplying cream, but now supplying milk for Army purposes, there are at present indications that cattle are being bought haphazardly at auction sales and otherwise to increase dairy herds, merely for the sake of additional milk supplies. These cattle are often the culls from herds reduced because of wartime difficulties.

This practice may fulfil immediate requirements, but it is fraught with serious consequences, because it may mean the insidious introduction into a herd of a class of cow which, before the change-over to milk supply, would not even be considered. Where these unknown cows are introduced into the herd because of immediate necessity, care should be taken not to breed the future herd from them (unless, of course, they qualify by test as good cows); otherwise, in many cases, herds which have taken years to build up on sound butter-fat production lines, may, after the war, prove to have greatly deteriorated.

—C.R.T.

Food Scraps for Pigs.

E. J. SHELTON, Instructor in Pig Raising.

IN feeding kitchen scraps to pigs, it is essential to consider the animal's habits, and the conditions under which the food is made available to the animal; the risks attached to feeding food scraps: the necessity for thoroughly sorting and then boiling the whole of the refuse food, especially meat; and hygienic measures necessary for the control of disease—in other words, to render the feeding of garbage a reasonably safe, even if a somewhat doubtful, undertaking.

The Pig and Its Food.

The pig is both omnivorous—feeding on all classes of food—and carnivorous—feeding on flesh. For best results in feeding, however, the pig should be given a mixed diet, well balanced in food elements. Sufficient food should be given at regular intervals, and served from clean utensils and in a clean trough affixed to an impervious feeding floor kept continuously clean.

The pig is not necessarily a glutton, but has a very vigorous appetite in health and an inborn fear that if he does not "hop in" and get his share of the available food the other fellow will take it all. Thus it is that under ordinary conditions there is a willing "go" at the food trough when once the buckets rattle and the meal is on.

At a very early age the pig should be trained to help itself to foods other than its mother's milk, and a few scraps of bread or vegetable, a piece or two of cooked meat and a little salt (but only a very little), and charcoal with some clean drinking water will encourage the animal to go further afield each day for its food.

Feeding Risks.

Food scraps as here referred to consists principally of refuse food from military encampments, hotels, restaurants, markets, stores, and domestic quarters, but it is only good if fed under the best of conditions, especially in tropical climates, for it very soon deteriorates and may become rancid if the containers in which it is held are not kept strictly clean and the food delivered and used as soon as practicable after it becomes available.

It is possible for uncooked meat in camp refuse to become the medium through which the virus of swine fever may be conveyed. This disease is highly infectious and quickly fatal, and it may spread through a piggery with great rapidity. Fortunately, the dread scourge is not

communicable to human beings, but man, birds, dogs, rats, and other "carriers" may be the means of conveying infection in a variety of ways.

Many suburban pig farmers are extremely careless in the feeding of food scraps and swill and spill portion of the contents of the container around the yards, thereby helping in the breeding of myriads of flies and attracting animals and birds. There is far greater risk in the feeding of camp kitchen refuse, especially on small suburban holdings, than is the case with dairy or mixed farm piggeries where such food scraps are not usually fed. People who are careless in their pig feeding practices are often ignorant of the great risk to the industry in the feeding of uncooked garbage food. The pig industry is far too valuable, especially in war-time, for such risks to be run.

The boiling of all refuse food is now absolutely necessary under regulations recently gazetted. By boiling is meant complete boiling (and frequent stirring) for at least one hour of all refuse food, inclusive of vegetable matter, bread, meat, and swill.

If conveniences for boiling are not available immediate inquiries should be made at the Department of Agriculture and Stock, Brisbane, with a view to ascertaining where such equipment may be obtained.

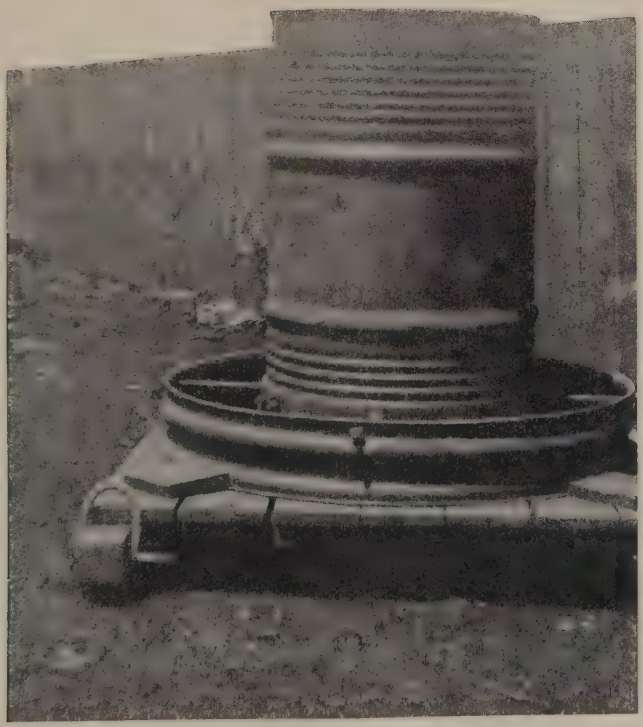


Plate 25.

Portable Water Fountain.—A dependable supply of cool drinking water is essential for pigs fed on kitchen scraps and similar foods, and a fountain like this is particularly useful where it is impracticable to pipe water to a piggery.

Collection of Camp Refuse.

Camp and restaurant refuse is usually bought and collected by pig feeders under contract. Contract buyers should strictly specify that the "pig tin" *must not* be used as a dump for soap suds, soda, ham or corned beef water, broken glass or bottles or other "foreign" material. Stale bread and vegetable matter should be stored in separate containers, and on the farm where it is fed there should be a rat-proof container, into which all extraneous materials should be placed for early disposal.

In the United States of America, in some cities, city garbage is processed and dried, resulting in the production of so-called "table scrap meal" or "garbage tankage." It is stated that the recovery of the fats in process of treatment enables the system to operate at a profit and with a greater measure of safety to the pig industry as a whole.

Suitable Scraps for Store Pigs.

Special care should be taken in the purchase of store pigs to be fed on food scraps or buttermilk, as these foods are normally quite unsuitable for very young weaners and slips. Weaning age is a very critical period in the life of a pig, and if there is any setback in growth at this stage—and there often is where pigs are weaned early and sent to saleyards—the animal rarely recovers normal growth; and if also at this stage there is a change-over to scrap food, serious bowel disorders may result. So only well-grown, strong stores, three months old or more, should be used for the consumption of camp kitchen refuse. Moreover, great care should be taken to protect the health of the pigs by isolating all new purchases until there is no longer a risk in their mixing with stock already on the farm.

Plate 26.

Portable Self-feeder for Pigs at the "Topping-off" Stage.—Camp kitchen refuse as a sole food is not a sufficiently balanced diet for pigs, hence some grain is a necessary addition. Grain is best fed in a dry, coarse meal form, and feeding is simplified by using a self-feeder such as is here illustrated.

Topping Up on Grain Essential.

While in the finishing stages of feeding it is necessary to avoid overfattening, it is equally necessary to allow the animals some grain food to "firm-up" the fat and put the animal into "prime" condition. Camp kitchen refuse varies so greatly in its composition, and is so often in variable supply, that it is a risky food, which is likely to be also deficient in mineral and vitamin content.

However, where "garbage-fed" pigs are efficiently topped up on grain, and some green food, there is no reason why the quality of the resultant pork should be low; in fact, normally, well fed "garbage-fed" pigs should realise satisfactory prices.

Cleanliness in all operations, feeding from clean impervious food troughs, affixed to impervious feeding floors, and the boiling of all scraps, regularity in feeding and the rule of "small feeds and frequent feeding" should always be the practice in "garbage" feeding piggeries.

Municipal Control.

In the larger cities and towns all "garbage" feeding piggeries must be licensed under the local authority, shire, or municipality. Particulars of the regulations may be obtained, free of cost, from the shire or town clerk, who also will supply the application form for license of suburban piggeries.

It is important that all containers and vehicles used in the cartage and feeding of camp kitchen scraps should be kept strictly clean. The garbage tins should be scoured out at the end of each day. The vehicle also should be well washed down.

At all premises where pigs are fed with cooked meat, offal, blood, or refuse the feeding floors must be constructed of concrete or other material impervious to moisture, and each feeding place, sty, or shelter must be kept in a clean and sanitary condition to the satisfaction of the Departmental Inspector.

Long-term Contracts Desirable.

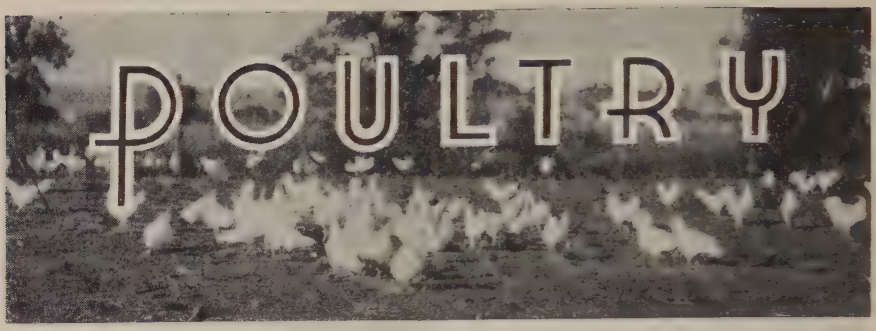
One of the disadvantages of garbage collection is that in many cases the contracts, often verbal, are of short and uncertain duration. Military contracts, however, have to be arranged in the usual official way—by tender—and are invariably of longer duration. In general, the term of a contract is largely influenced by the satisfaction given by the collector to the person or organisation supplying the food. The big advantage of a long-term contract is that the farmer is enabled to spend more money on the layout and equipment of his piggery and in the purchase of foundation stock.

CORRESPONDENCE COURSE IN PIG-RAISING.

The Department of Agriculture and Stock offers to persons interested in pig-raising, resident in Queensland, a free course of instruction by correspondence. This course comprises forty-eight lessons, one or more of which may be completed each week, according to the time available for study.

The lessons cover breeds, selection of stock, breeding, feeding, management, and marketing; plans of piggery equipment and notes on pig feeds are also included. There is also a section dealing with slaughtering and farm curing of bacon.

Farmers, persons employed on farms, or those interested in rearing pigs but not farming may enrol by forwarding a written application to the Under Secretary, Department of Agriculture and Stock, William Street, Brisbane.



The Feeding of Chickens.

P. RUMBALL, Poultry Expert.

CHICKENS grow rapidly in the early part of their life, especially during the first six to eight weeks. Consequently, rations with a relatively high protein content are necessary to ensure the best development. It has been established that rations having a crude protein content of 18 to 20 per cent. should be used during the first six to eight weeks, and after that period this should be reduced to 15 per cent. The protein requirement of a chicken does not alter as sharply as this, but the periods mentioned and the protein requirements of the chicken at this stage in its life are considered sound for all practical purposes.

Milk is considered the most desirable protein feed for chickens and growing stock, but because of its cost its exclusive use is not always practicable. Wherever possible, milk should form a portion of the ration. It may be given in the form of curds, semi-solid milk, buttermilk, or buttermilk powder. As a drink, milk is excellent, but it is objectionable because of the difficulty of keeping chickens clean. Buttermilk powder is favoured because of the ease with which the powder may be incorporated in the mash, thereby controlling the kind of food that each chicken consumes. Apart from its concentration, however, it has no definite advantage from a feeding value point of view. Proteins build flesh, but at the same time a bony framework is necessary. Examination of the chicken at different ages indicates that it is particularly important to allow for the mineral requirements from the eleventh to the twenty-fourth week. In all experiments conducted by the Department of Agriculture and stock, provision has been made for increased mineral intake by the addition of bonemeal to the mash at eight weeks of age, and by allowing the birds free access to grit (shell and hard).

The table showing the food consumption of chickens (see page 113) has been compiled as a result of actual experiments conducted at Yeerongpilly.

The variation in weight from week to week and the ever-increasing amount of food required suggest the undesirability of laying down hard and fast rules as to what quantity should be supplied.

The food requirements increase week by week and a system of feeding which enables the growing birds to consume all they need is the most desirable.

FOOD CONSUMPTION OF CHICKENS.

Age.	Leghorns.		Australorps.	
	Weight of Chickens.	Food Consumed Weekly.	Weight of Chickens.	Food Consumed Weekly.
	Oz.	Oz.	Oz.	Oz.
Day old	1·3	..	1·36	..
1 week	1·97	1·64	2·14	1·53
2 weeks	3·31	3·36	3·61	3·32
3 weeks	5·31	4·80	5·84	5·05
4 weeks	7·61	6·46	8·68	7·20
5 weeks	9·94	7·58	12·08	6·89
6 weeks	12·92	8·96	15·86	10·62
7 weeks	16·65	8·65	20·17	13·95
8 weeks	20·41	13·29	25·31	15·05

By reason of the fact that the kind of food consumed is easily controlled, and that it is always in front of the birds, the all-mash system of feeding chickens is suggested as being the most desirable. All-mash should be placed in shallow trays about 1 inch in depth during the first few days. Trays of a depth of 2 inches should then be used, and by the end of the first week narrow trays or troughs 4 inches deep should replace these. At this age chickens will commence to scratch with more vigour, scattering the feed from the trough. This can be prevented by placing a piece of netting on top of the mash loose enough to sink with the mash as it is gradually consumed. During the first week, 8 lineal or running feet of feeding space should be allowed for every 100 chickens, and increased later to 12 feet. Before the mash is covered with netting, it is important that only a little food at frequent intervals be placed in the trays so as to avoid wastage. In fact, the frequent feeding of all-mash appears to induce greater food consumption and better development.

Breeders who do not desire to feed an all-mash may make use of commercial chick grains and growing mashes, which may be fed as directed by the manufacturers. It has been the custom for many poultry raisers to use scratch grain only for a short period of a chicken's life, but in view of the more satisfactory results obtained by feeding a ration of a relatively higher protein content than is usually contained in chick mixtures, early mash feeding seems essential.

Chickens from about two weeks old may be reared satisfactorily on moistened mashes and grain but the mashes should be fed at frequent intervals. This system has the advantage of using milk, when available, to moisten the mash. The feeding of dry mash, however, is suggested as a safer method, as the possibility of food becoming sour and the probable consequent bowel trouble among chickens is avoided.

ALL-MASH RATION.

	1 to 8 Weeks.
	Per cent.
Maize meal	40
Bran	20
Pollard	20
Meat and bone meal (63 per cent. protein)	7½
Dried buttermilk powder	10½
Salt	1
Cod liver oil	1

The mash set out above has been used successfully in many experiments conducted by the Department of Agriculture and Stock in feeding chickens to the age of eight weeks. At the present time it may not be

practicable to adhere strictly to this ration because of the cost of some of the ingredients, but in view of the small amount of food consumed by the chicken early in life and the benefits that follow a good start in life, the additional outlay is justified.

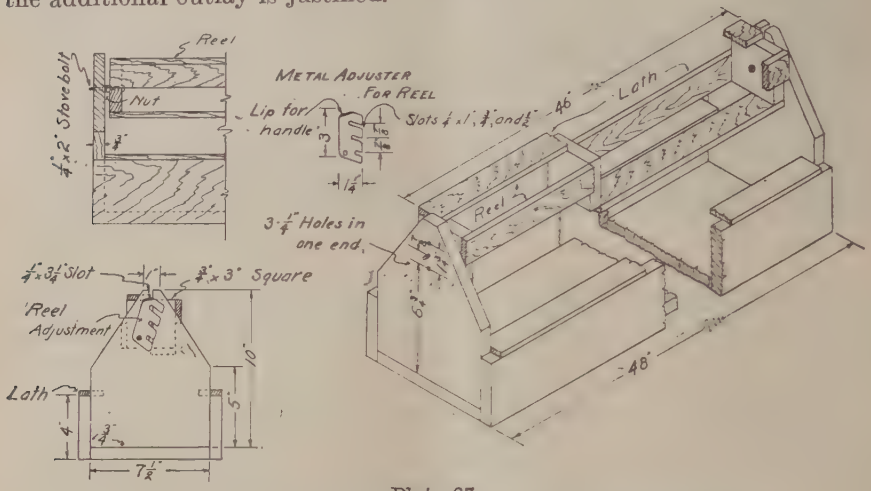


Plate 27.

Details for making intermediate sized chick hopper with revolving reel for chicks over five weeks of age.

It will be noted that cod liver oil has been used in the all-mash ration. This is not obtainable to-day. Its use was necessary to supply vitamin D, and to some extent vitamin A. There is sufficient vitamin A in the maizemeal if yellow maize is used, and the lack of vitamin D can be overcome by allowing the chickens to have constant access to sunlight.

Because of the cost of maize, there will be a tendency to cut down on the quantity incorporated in chicken mixtures. This should not be done if at all avoidable, but if it is done a good supply of succulent green feed should be available.

Green feed may be fed to chickens when only a few days old. The tearing up of some succulent greens—such as lettuce and Chinese cabbage—is suggested, and when the chickens take to green feed in that form the whole head can be placed in the run and the chickens will tear it up as required. This method of feeding green feed provides occupation, and so assists in curbing vices.

When eight weeks old chickens need a different ration. Some breeders alter it at six weeks. Many just change from an all-mash starting mixture to a laying mash and grain, allowing the birds to largely balance their own requirements. When this practice is followed, chickens should be given all the grain they will eat.

Laying mashes do not contain the maize meal that starting mashes have. Therefore, in the change-over the vitamin A content of the ration will be reduced below the level essential for health and development. This difficulty at the present time may only be overcome by feeding an abundance of green feed. If ordinary green feed is unavailable, some of the best-quality lucerne chaff obtainable may be used as a substitute. The quality of the chaff should be judged by its green colour and the amount of leaf it carries. Greater consumption of lucerne may be stimulated by soaking it in the quantity of water which it will absorb in 12 to 24 hours.

ANIMAL HEALTH

Pneumonia of Swine.

G. R. BRETTINGHAM-MOORE, Veterinary Officer.

PNEUMONIA is of common occurrence in Queensland and, in general, is of two types, parasitic and infectious.

As the parasitic type is adequately described in the departmental bulletin "Parasites of the Pig," only the infectious type will be dealt with here. It may occur without any apparent source of infection being noticeable, but is usually associated with unsatisfactory conditions of management, whether of diet or accommodation.

Symptoms.—Lack of appetite, high temperature and, perhaps, nervous symptoms and a staggering gait. Breathing rapid and difficult, accompanied by coughing, accounts for the common name of "pants." There may be discharges from eyes and nose.

Deaths may occur in twenty-four hours or the sickness may last for a week or two. Some pigs recover wholly or partially. Lameness and swollen joints may occur, and red blotches may be seen on the skin.

Treatment.—Sick pigs should be isolated. If they do not improve in a few days, slaughtering and burning are advisable, for if they recover after a severe attack, they may become "carriers," providing a constant source of re-infection.

Diagnosis.—This type of pneumonia may be, to some extent, differentiated from the parasitic type, as in the infectious type not all pigs are affected, but a substantial percentage die, whereas in the parasitic type nearly all are affected, but deaths are few.

Post Mortem.—The principal changes are seen in the lungs. There is a considerable amount of fluid in the chest cavity, and patches of the lung tissue are dark red and solid, not having the elasticity which characterises the healthy organ, but feeling like a piece of liver.

The surface of the lungs may adhere in parts to the chest wall, and in old-established cases the solid areas are often greyish and dotted with small yellow spots. In addition, one or more small abscesses may be present.

Prevention.—Prevention is obviously of first importance, and the routine isolation of all sick and unthrifty pigs immediately their condition is noticed is the first step in successful control. For the rest, close attention to the principles of housing and general hygiene will do much to prevent outbreaks and limit their severity when they do occur. All contaminated yards and pens should be spelled for a couple of months.

LANTANA POISONING IN CATTLE.

In winter, when green feed is short, lantana poisoning may occur. As a rule, the history of lantana poisoning is one of cattle moved to a new run. Their condition falls away rapidly, and, if in milk, the supply dries up. The muzzle is dry and covered with scabs and may become quite raw. Hence the name pink nose. Mucus streams from nose and eyes, which later become deeply sunken. The appetite is impaired or absent. Certain parts of the body, especially the udder, become very itchy and later covered with scabs. Large areas on the thighs and buttocks, and, in fact, almost anywhere on the body, may become raw from rubbing against trees and posts, consequent on the intense itching.

Death is often the sequel and recovery, if it occurs, is slow and may be incomplete. No satisfactory treatment is known, but a drench containing 2 teaspoonfuls of potassium permanganate, 1 lb. magnesium sulphate, ¼ lb. molasses in 1 quart of water, has been suggested, and might be tried for want of something better.

In addition, shade and protection from the weather should be provided and ample green feed and water given. The raw areas should be covered with Stockholm tar to allay the irritation.

Children should be warned against eating the berries of the lantana, as cases of poisoning have been reported.

—G.R.B.-M.

MILKING COWS BEFORE CALVING.

The practice of milking cows before calving is a bad one. Pressure within the udder giving it a distended appearance is not harmful, although the cow may look uncomfortable. The chief reasons for not milking cows before they calve are:—

1. Colostrum, or beastings, is taken away, and so is not available to the newly-born calf.
2. Quarters milked often become pendulous or baggy after calving.
3. Milking before calving is especially bad for heifers, because, with the stimulation of the milk secretion, the growth of udder tissue stops;

Milking before calving does not make a cow more susceptible to milk fever; on the other hand, it is sometimes done to assist in the prevention of milk fever.

Agricultural Chemistry

Lime Supplements for Stock.

J. L. FORAN.

ANALYSIS of grains show, in general, good protein content, and while the *quality* of the protein is better in some than others, for practical purposes sufficient protein is obtained from the feeding of grain. The mineral contents of grains show fair amounts of phosphorus, but are exceedingly low in calcium.

Corn (maize) contains ·01 per cent., wheat ·03 per cent., oats ·09 per cent. Sorghums are about the order of wheat. Legume roughage and hay have good to very fair amounts of calcium. Even on soils containing little calcium relatively fair amounts of this mineral are contained in these roughages.

Farm animals are prone to suffer from the lack of sufficient phosphorus and calcium. Seeing that these two elements constitute about three-fourths of the mineral content of the whole body, and more than half the mineral content of milk, it is obvious that when feeding grain sorghum, which contains fair amounts of phosphorus, the addition of a calcium supplement is necessary.

This is even more important when grain sorghum forms a large proportion of the ration.

Though bone meal, a compound of calcium and phosphorus, may be used, it is cheaper to feed other forms of lime and to reserve bone for conditions where both calcium and phosphorus are deficient.

The following list indicates the value of the various lime supplements—

(1) Ground limestone, the best quality of which contains up to 38·5 per cent. of calcium.

(2) Dolomitic limestone, which contains magnesium carbonate, is fairly satisfactory.

(3) Ground shells, very similar to ground limestone.

(4) Marl, satisfactory if the clay and sand content is not too high.

(5) Wood ashes, containing about two-thirds the amount of calcium in ground limestone.

(6) Gypsum supplies calcium in the form of sulphate instead of carbonate, and has been found satisfactory.

Unslacked or water slaked lime should not be used on account of their caustic nature.

The above supplements, if not incorporated in the ration, may be supplied as a lick by mixing two parts of finely ground limestone or its equivalent to one part of salt.

Cyanogenetic Plants.

W. R. WINKS.

QUEENSLAND has a number of plants which contain prussic acid, and which constitute a potential danger to our livestock. In normal seasons the quantity of these plants eaten by stock is so small that deaths from them are rare. Shortage of green feed, however, brings them into greater demand by our livestock, especially as some of them are more resistant to frost damage than the grasses which constitute our natural pastures.

These cyanogenetic plants (i.e., plants which contain prussic acid) occur both in and out of cultivation. Feeding tests in various parts of the world indicate that plants containing twenty milligrams of prussic acid per 100 grammes of green plant are dangerous to stock, and it is with plants which fall into this category that the writer proposes to deal in this note.

Sorghums.—It is a well-known fact that most sorghums contain prussic acid when young, but such care is generally taken in the feeding of them that the presence of this poison has not been allowed to detract in any way from the high esteem in which they are held as fodder plants. Cases, however, have come under the notice of this Department where farmers have found ratoon sorghum growths 6 to 12 inches high showing signs of frost damage, and rather than lose this green feed have turned cows into it with fatal results.

The Wild Sorghum (*Sorghum verticilliflorum*) and Johnson grass are cyanogenetic over their whole life period, and constitute special danger during autumn and winter when other feed is scarce.

Couch Grass.—Several of our couch grasses are cyanogenetic, and have been known to cause quite severe losses among hungry stock.

Shrubs.—Two shrubs which contain particularly large amounts of prussic acid in their leaves are the Wild Plum (*Ximenia Americana*) and the Wild Fuchsia (*Eremophila maculata*), both of which are eaten to some extent by stock.

It is a peculiar fact that some stock can become accustomed to these cyanogenetic plants and eat them with impunity, while other stock newly introduced to them soon die.

SOIL AND WATER.

How many people watering the garden with a hose dig down to see how far the water has penetrated into the soil? To water efficiently it is necessary to soak the soil to 10 or 12 inches. Most of the plant roots go down to 12 inches—some penetrate deeper. The top 2 inches of soil is mostly kept loose through digging out weeds and grass and keeping the surface worked with the idea of preventing evaporation. It can be seen from this that watering to 4 inches deep is not very beneficial to the plants, and is not economical watering. Water evaporates quickly from the surface of the soil, and unless the water is sufficient to give the soil a good wetting the practice of sprinkling the surface is wasteful, as it is only applying water which is quickly lost into the air and the roots of the plants are in dry soil.

—F.K.

Marketing

Supply of Fruit and Vegetable Cases.

J. W. GARSDEN, Marketing Branch.

THE difficulty of obtaining enough cases for the marketing of fruit and vegetables is becoming more acute, and it may soon be necessary to consider whether efforts to provide sufficient timber and nails for new cases and to recover used cases should not be supplemented by other measures. The timber industry is being asked to meet an enormously increased demand for cases and crates of all kinds, as well as for building timber. Notwithstanding the substitution of plywood for ordinary sawn timber in the making of cases, such as butter and munition boxes, considerable difficulty in meeting requirements is being experienced.

The possibility of a case shortage was foreseen by the Government at the beginning of the war and early action was taken to ensure the conservation of used cases for fruit and vegetables. An appropriate authority was set up to administer "*The Second-hand Fruit Cases Act of* 1940," which in the controlled area prohibits the use of second-hand fruit cases for any purpose other than as containers for fruit and vegetables, and provides for trading-in used cases only through dealers licensed by the committee of control. This committee has succeeded in conserving considerable numbers of cases which would otherwise be lost to the industry, and in recent months case sales to growers by licensed dealers have approximated 100,000 a month.

The Department of Agriculture and Stock has kept in contact with the timber authorities regarding case supplies, and with the co-operation of the several interests concerned, including the principal case distributors, has so far been able to avert a serious shortage of supply during harvest periods.

There are, however, certain factors affecting an adequate supply of cases for future requirements, which are now beginning to claim attention. Firstly, there is the loss of cases conveying fruit to interstate markets and to combat areas. This loss is only partly offset by cases containing fruit brought into Queensland. Then there is the expansion of production of cased lines in preference to vegetables not usually marketed in cases; for example, the relatively high increase in tomato-growing as compared with, say, cabbages, and, finally, the increasing use of cases for the marketing of bananas, beans, and lettuce, and other produce which until comparatively recent years were marketed by the bunch or bag.

How, and to what extent, control measures should and could be taken respecting these factors are points which have already been

tentatively raised. To date, efforts to meet case requirements have been concentrated in the direction of increasing supplies, but no action has been taken to regulate demand.

There are, undoubtedly, a number of considerations which make it undesirable that there should be any restriction of the free choice of markets or of the kind of crops grown. No one will question the advantage or the desirability of using cases for marketing such crops as lettuce; but, conditions being as they are, the question arises can the industry afford to risk a serious breakdown of supplies if it can be avoided by an adjustment of its own demands

PIGMEAT REQUIREMENTS.

As from 9th August, 1943, the slaughtering of porker pigs of less than 100 lb. carcase weight will be prohibited. In addition, the sale in shops of pork from carcases of less than 100 lb. carcase weight will be forbidden.

In recent months there has been a sharp and substantial increase in pigmeat requirements, an increase that arises from the large demands of the fighting services and also from Britain's request for larger quantities of pigmeats. These demands call for a decided concentration on the production of heavy weight baconers, which is the most effective immediate method of increasing pigmeat output.

Under *The Pigmeat Acquisition Plan*, all pigs of more than 100 lb. dressed weight, which have been slaughtered in registered establishments, are acquired by the Commonwealth Government. The plan does not provide, however, for the acquisition of lighter pigs, the price of which has hitherto been controlled indirectly by means of a wholesale ceiling. In an effort to encourage the maximum production of baconers, and to discourage the sale of pigs as porkers, the wholesale ceiling for pork was lowered to a price equivalent to 6d. per lb. to the producer, but more rigid control has become necessary. There is a grave risk of pig-raisers concentrating on the production of light-weight pigs with disastrous results, so far as service and export supplies are concerned.

These restrictions will not necessarily result in the removal of all fresh pork from the local market. The Services must, of course, have first call on pigmeat supplies, but a proportion of the carcases between 100 lb. and 120 lb. weight should be available for civilian consumption as fresh pork.

A restriction on the slaughter of light-weight pigs operates in New Zealand.

Pig-raisers are appealed to to carry on every pig to heavier weights, and where suitable up to a weight not exceeding 180 lb. dressed, which is equivalent to live-weight of 240 lb., the maximum of the weight range prescribed for baconer pigs. There will be a proportion of pigs which cannot be carried to the maximum weight without excessive fat. Those pigs will need to be slaughtered at less than 180 lb., but every pig which can be carried on should be carried on. Pork has become a luxury; bacon, and especially heavy-weight bacon, is a vital wartime foodstuff.

General Notes

Sugar Levy.

Regulations approved under *The Primary Producers' Organisation and Marketing Acts* empower the Maryborough mill suppliers' committee to make a further general levy for administrative purposes on suppliers of sugar-cane to the Maryborough mill at the rate of one halfpenny per ton. A levy of one halfpenny was approved earlier in the sugar season.

Staff Changes and Appointments.

Mr. J. J. Shelvey, Inspector of Stock, has been transferred from Warwick to Dalby.

THE QUEENSLAND AGRICULTURAL JOURNAL.

ANNUAL RATES OF SUBSCRIPTION.—Farmers, Graziers, Horticulturists, and Schools of Arts in Queensland on **prepayment of One Shilling**. Members of Agricultural and kindred Societies **Five Shillings, in Queensland** post free. Others **Ten Shillings,** post free.

Remittances should be made by postal notes or money order. Postage stamps will be accepted, but no responsibility will be taken by the Department for any loss due to this mode of remittance.

All subscriptions should be sent with order to **The Under Secretary, Department of Agriculture and Stock, Brisbane.**

A two, three, or five years' subscription is preferable to annual payments. This ensures continuity of despatch and reduces clerical labour.

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Please write Plainly.

Postal Address.....

.....

To the Under Secretary,
Department of Agriculture and Stock, Brisbane.

For the enclosed..... *please forward me the "Queensland Agricultural Journal" for*..... *years.*

My main source of Income is from.....

State whether "renewal" or "new subscriber" .....

NOTE.—Subscribers who wish to obtain the Journal for the month when the subscription is sent, must apply before the tenth of that month.

Rural Topics

Horse Training.

A kindly temperament is probably the most desirable quality in the horse trainer. In the training and education of horses several natural difficulties have to be contended with. In the first place the horse is much more powerful than man, and just so far as it learns that it can resist man's control will it gain courage and be inclined to combat the trainer. The horse, during the early part of its training, should, therefore, be treated so that, however wild or apparently unmanageable it may appear, successful resistance is impossible, while, at the same time, everything possible is done to enable the animal to do what is required by the trainer. If this practice is adopted the animal learns that it will not be injured by the trainer, and it is found that the horse will generally submit to training and do anything for which it is by nature adapted.

A horse's methods of understanding are entirely dependent on the experience of its senses of seeing, hearing, smelling, and feeling. To prevent it becoming excited or frightened of objects and sounds with which it is necessarily brought in contact, the animal must be convinced, through these faculties, of the harmless and innocent character of those objects and sounds. The horse, being unable to understand the meaning of articulated language, except in so far as words are associated with actions, must be addressed on its own plane of understanding, because it is only by doing so that man can expect the animal to comprehend his wishes clearly.

The horse, however, has a very retentive memory, which should be made full use of, particularly in the early stages of the animal's education, by freely using methods of suggestion. The police horses which head every public procession in Brisbane are outstanding examples of good horse training.

Flies Spread Mastitis.

At the Florida Agricultural Experiment Station (United States of America), cows shown to be free from all traces of mastitis were placed in a screened, isolated building. Flies were kept to a screened cage and allowed to feed freely on milk from the quarters of mastitis-infected cows. Through use of a special "fly-holder" the insects were then permitted to contact the teat openings of the healthy cows. The disease was readily transmitted by this method.

Too many good farmers err in thinking of mastitis as an individual cow problem rather than as a herd disease.

In reality, there are two distinct forms or types—namely, acute and chronic cases. Acute cases show fever, loss of appetite, warmth, hardness, and discolouration of one or more quarters and, all too often, death from septicemia or blood-poisoning.

But the chronic cases, though less spectacular, are the dairy farmers' real enemy. The causative germs, usually streptococci, may lie dormant in the deeper parts of the udder for weeks or months. Damage is so gradual that owners note scarcely any external evidence of the trouble. However, little by little, "udder trouble" spreads to other cows in the herd and milk profits decrease. To all this is added a public health problem, for some types of "streps" from diseased udders may cause septic sore throats in people.

Of course, flies are not the only means of spreading mastitis. Contaminated milking machines, careless wet-hand milking, stripping infected quarters on the floor, and so on, may be responsible.

Another Way of Using Whey.

Here is still another way of using whey:—The Bureau of Dairy Industry in the United States has announced the perfection of a process by which a new transparent rubber-like plastic can be made from the lactic acid of whey. This new substance is said to have many valuable industrial uses. Plainly, whey is increasing in importance as a valuable by-product of the dairy industry.

Maternal and Child Welfare.

Under this heading is issued each month an article, supplied by the Department of Health and Home Affairs Maternal and Child Welfare Service, dealing with the welfare and care of mother and child.

BABY'S HEALTH—NATION'S WEALTH.

THE MAGIC OF TOYS (2).

TOYS and other play materials are so very important in the life of the child, because, properly chosen and used, they can educate him as well as amuse him, thus aiding in his mental and social as well as physical development. Providing suitable toys in war time presents a difficulty to many parents, because of their scarcity as well as their high price, but useful and interesting toys may be made out of cigar boxes, clothes pegs, cotton reels, boxes and tins of all sizes, some three-ply, a broom handle, and perhaps a pine packing case. With these materials and some bright-coloured paints, cotton waste and scraps from a sewing bag there are the requirements of a promising toy factory all ready to commence work.

Regarding paints, it is important that they do not come off easily or contain lead. Any reliable firm will advise on these matters if it is explained what the paints are for.

From three to eighteen months, a baby needs toys which appeal only to three senses—sight, hearing, and touch. Tins or boxes containing small stones or buttons can be fashioned into rattles with a little ingenuity and a flat coffee or cake tin can be made into a drum with holes punched through the middle of lid and bottom of tin, edges smoothed, and a strong string passed through and tied with a firm knot. Clothes pegs may be used for drumsticks. Rubber toys are unprocurable, but toys made from scraps and firmly stuffed with cotton waste are easily made. Most large stores supplying dress materials have patterns for these toys with full directions for making.

A home-made rocker gives as much fun as the more expensive variety and can be made with an ordinary pine box, provided it is large enough for the child to sit in comfortably. The bottom of the box should be fitted with curved runners. Painted in bright colours with a small border it can look very attractive.

Hobby horses can be made of pieces of broom handles with a cut-out horse's head attached. A push cart needs specially prepared timber, but is quite simply made.

All children like trains, which can be made with blocks of wood about 6 inches long for cars joined together by cup hooks and rings. A 3-inch length of broom handle makes a good boiler for the engine with a cotton reel for a funnel. Wheels are not necessary especially for very small children, but, if required, can be made of 1 inch dowelling or broom handle fastened to the cars with split pins.

Cotton reels painted in different bright colours can be used as beads and threaded on to a strong shoe lace. A colour stand, besides providing amusement, will teach a child form, colour, and number without any conscious effort on his part. This can be made of a rectangular piece of wood in which are set three uprights of heavy gauge wire. Groups of six or more cubes each drilled with a hole are placed on the wire; one group coloured blue, one yellow, and one red. At first a child will mix the colours in taking them on and off, but he soon learns to put them in their right groups. Cotton reels may be used instead of wooden cubes.

Insets, made from three-ply, teach concentration—a most important attribute. Clothes pegs may be scarce at present, but if obtainable the tiny tot will play happily putting them on and taking them off the edge of a tin. Duco or paint both pegs and tin in bright colours. Blackboards are easily made with three-ply inked over with a blackboard preparation, and children may spend fascinating hours on wet days with a box of coloured chalks. Drawing teaches hand and arm control and concentration.

Children like using a hammer and nails and a carpenter's bench made in the shape of a cross with a box of nails fixed in the centre will keep several kiddies happy for a long time. The little carpenters stand at each end and hammer nails into pieces of soft wood to their heart's content. There is no danger of their hitting each other, and since they naturally hold the hammer near the head they do not raise it very high and so small fingers are fairly safe.

A slide is another thing of which toddlers are very fond, and since it encourages them to climb and is quite safe, it is excellent to set one up in the back yard. A plank 4 feet long by 1 foot wide made with a firm catch at top and bottom, the top catch hooking over a carpenter's horse is all that is required. The children can crawl up the horse and slide down or up the slide and slide down, whichever they fancy.

Tinkler toys of cotton reels and discarded silk stockings, doll's furniture made with cigar boxes and clothes pegs, a hammering board with a box and pieces of broom handle are just a few more of the home-made articles which with bright-coloured paints can bring the magic of toys to the children's Christmases and birthdays, even in war time. Any further particulars on this subject or any other concerning Maternal and Child Welfare may be obtained by communicating personally with *The Maternal and Child Welfare Information Bureau*, 184 *St. Paul's terrace, Brisbane*, or by addressing letters *Baby Clinic, Brisbane*. These letters need not be stamped.

IN THE FARM KITCHEN.

The Makings of a Square Meal.

Potato Soup.—Peel and cut up potatoes allowing one for each member of the family. Cover with water, boil to a mash and rub through a sieve; add pepper, salt, butter and marmite to taste. Return to fire, heat but do not boil, and serve with squares of fried bread or toast.

Green Pea Soup.—½lb. dried green peas, 2 large onions, sprig of mint, 2 quarts of water, a little fresh milk. Soak the peas in cold water for 24 hours. Wash thoroughly and put them on to boil with the 2 quarts of water, 1oz. butter or dripping, or rinds or fat ends of bacon, and a small pinch of carbonate of soda. When boiling, add the cut-up onions, boil for 1 to 1½ hours; strain and rub the peas through the sieve; add pepper, salt and milk; return to the fire, warm up again but do not boil. Serve with fried squares of bread or toast; serve hot.

Red Pottage.—½lb. haricot beans, ½lb. tomatoes, 1 large beetroot, pepper and salt, 1oz. butter or dripping, 2 large onions, piece of celery or parsnip, 2 quarts water. Soak the beans in cold water for twenty-four hours and put them on to boil with the 2 quarts of water and butter. When the soup comes to the boil, add the tomatoes, the bit of celery or parsnip (can be left out if not in season), and the onions all cut in small pieces, and the beetroot peeled and sliced thinly. Allow to boil for two to two and a half hours, strain, rubbing the beans, etc., through a sieve, strainer or colander, add pepper and salt to taste. Warm the soup up and serve with fried squares of bread or dry toast. This is an excellent variety of soup, and is very nourishing, especially for children.

Tripe and Onions.—1lb. tripe, 2 onions, 1 pint milk, 1 teaspoon butter, 2 tablespoons flour, 1 dessertspoon chopped parsley, pepper, salt. Remove fat from tripe, cut meat into pieces 2 inches square. Put tripe into saucepan, cover with cold water, bring to the boil, then pour water off (balancing). Cover with fresh water, add salt and onions, cook gently till tender (about two hours). Pour off water, cut onions up finely and add milk, and bring to boil. Blend flour with cold milk, add to tripe, stir over fire until it boils and thickens. Cook for a few minutes, add parsley and cayenne pepper. Serve on hot dish; garnish with triangles of dry toast.

Pot Roast of Topside Steak for Large Family.—Ask the butcher to cut the meat in one thick piece. Heat a little fat in a strong unlined saucepan, and brown the meat quickly all over. Turn with two spoons so that each side may be well browned. Cut up two or three onions and place them beside the meat. Cover with a tight-fitting lid, and cook gently three or four hours. Every half hour put into the saucepan, one or two tablespoons of boiling water or stock. Lift the meat on to a hot dish, place the onions round, and serve the unthickened gravy separately.

This dish may be varied by cutting a pocket in the meat and stuffing with forcemeat or cooked rice, flavoured with nutmeg and chopped onion.

Steak or Kidney Pie or Pudding.—1lb. of skirt, chuck or bladebone steak and 2 sheep's kidneys or ½ an ox kidney, 1 small onion, 1 tablespoon flour, salt, pepper, stock or water, suet paste or simple pastry about ½lb. flour. Cut steak and kidneys into dice, remove fat, slice onion finely. Roll the meat in flour and seasoning. Steam the meat in a basin or simmer gently in a saucepan till tender, 2½ to 3 hours. If a pie is to be made, put in a pie dish and cover with a simple pastry. Bake 20 minutes in hot oven. If a pudding, put meat into a basin and place the suet paste on top. Steam in a large saucepan for 1½ to 2 hours with the lid tightly closed.

Plain Steam Pudding and Treacle.—2 heaped tablespoons of dripping, 1 teaspoon soda, 1 pinch salt, 2 cups flour, cerevite or fine wholemeal, 2 teaspoons of cream of tartar, 1 cup of water. Sift the dry ingredients together, rub dripping well into flour, till it is crumbly; mix with water to a firm dough. Put into a greased basin; cover lightly with butter paper, and steam for two hours. Serve with treacle or golden syrup. Children like this pudding.

PRODUCTION RECORDING.

List of cows and heifers officially tested by officers of the Department of Agriculture and Stock which have qualified for entry into the Advanced Register of the Herd Books of the Australian Illawarra Shorthorn Society, the Jersey Cattle Society, and the Ayrshire Cattle Society, production records for which were compiled during the month of June, 1943 (273 days unless otherwise stated.)

Name.	Owner.	Milk Production.	Butter Fat.	Sire.
		Lb.	Lb.	
AUSTRALIAN ILLAWARRA SHORTHORN				
Senior, 3 Years (Standard 290 Lb.).				
Mountain Camp Rosette 5th	W. Caldwell, Bell	7,091·04	316·186	Trevor Hill Reflection
Senior, 2 Years (Standard 250 Lb.).				
Cedar Grove Ellen 9th	J. Crookey, Alloia	7,033·5	270·67	Cedar Grove Monarch
Trevor Hill Greta 2nd	A. B. Wilson, Harlaxton	6,872·0	259·411	Sunnyview Royal
Junior, 2 Years (Standard 230 Lb.).				
Ardilea Broady 8th	W. Hinricksen, Clifton	6,905·0	316·896	Newstead Reliance
Edendell Lovely	R. Manderson, Gleneagle	6,690·1	259·586	Edendell Prince
Glen Idol Primrose 6th (249 days)	P. Doherty, Gympie	6,024·1	240·88	Blackland's Count
JERSEY.				
Mature Cow (Standard 350 Lb.).				
Trecarne Rosella 8th	T. Petherick, Lockyer	7,043·6	452·656	Trinity Some Officer
Trecarne Jersey Queen 3rd	T. Petherick, Lockyer	6,273·5	383·539	Trinity Some Officer
Larette of Calton	W. Bishop, Kenmore	7,739·35	381·505	Adrian of Calton
Lermont Duchess	J. Schull, Oakey	6,832·2	373·638	Woodside Golden Volunteer
Trecarne Graceful	T. Petherick, Lockyer	5,842·35	352·289	Trinity Some Officer
Junior, 4 Years (Standard 310 Lb.).				
Lermont Claribell	J. Schull, Oakey	6,223·05	343·053	Woodside Golden Volunteer
Senior, 3 Years (Standard 290 Lb.).				
Glenview Glorious	F. P. Fowler and Sons, Coalstoun Lakes	6,133·98	319·203	Trinity Governor's Hope

Junior, 3 Years (Standard 270 Lb.).				
Trecarne Eileen 8th	T. Petherick, Lockyer	6,379·3	350·276	Jerseylea Golden Duke
Trecarne Dairymaid 4th	T. Petherick, Lockyer	5,375 6	324·467	Jerseylea Golden Duke
Glenview Pilgrim Duchess	F. P. Fowler and Sons, Coalstoun Lakes	4,761·52	271·672	Woodside Renown 2nd
Senior, 2 Years (Standard 250 Lb.).				
Trecarne Attractive	T. Petherick, Lockyer	6,080·6	378·072	Jerseylea Golden Duke
Gem Cynthia	W. Bishop, Kenmore	5,944·3	313·863	Calton Lothean
Junior, 2 Years (Standard 230 Lb.).				
Strathdean Duchess 2nd	S. H. Caldwell, Bell	7,232·42	374·973	Strathdean Dahlia Lad
Lermont Lockette	J. Schull, Oakey	5,533·7	310·491	Woodside Golden Volunteer
Glenview Vanity	F. P. Fowler and Sons, Coalstoun Lakes	4,909·0	281·244	Trinity Governor's Hope
Glenview Rosina	F. P. Fowler and Sons, Coalstoun Lakes	5,238·71	263·836	Trinity Governor's Hope

AYRSHIRE.

Mature Cow (Standard 350 Lb.).				
Leafmore Lady Laurel	J. P. Ruhle, Motley	6,717·5	358·54	Leafmore Colin
Leafmore Joybna Ralston	J. P. Ruhle, Motley	7,824·5	354·225	Leafmore Clarry
Junior, 3 Years (Standard 270 Lb.).				
Elersley Angeline	St. Christopher's Stud, Brookfield	8,241·8	307·776	Benbecula Banker
Junior, 2 Years (Standard 230 Lb.).				
Leafmore Billie Burke	J. P. Ruhle, Motley	6,250·25	283·592	Myola Jellicoe
Leafmore Phyllis	J. P. Ruhle, Motley	5,844·55	277·115	Leafmore Bonnie Boy

GADGETS AND WRINKLES

BUILDING WITH BAGS.

AT the present time, building materials are hard to get and farmers have to make use of whatever materials are available. The poultry farmer, particularly, with production expanding, is often faced with the necessity for extensions or additions to his fowl houses and storage sheds.

A fowl house or shed can be built cheaply with timber and cement-washed bags. Admittedly, even sacks may be scarce, but there are usually some available—fertilizer bags, for instance—which may no longer be usable for their original purpose, yet quite good enough for the job. If sawn timber for the frame is unavailable, bush timber may be substituted.

Here are the specifications for a cheap bag building:—

The principle of the structure is the substitution of bags for boards, the bags to be weatherproofed with a cement wash. In practice, so long as the sacks are not rotten, their condition does not matter. Holes can be roughly darned or patched and are completely covered when the job is done.

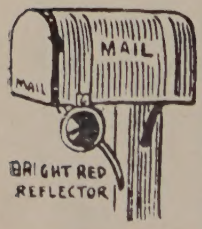
The frame of the building is made in the usual way with posts and scantling, and the most convenient distance to set them is about two feet, but if the sacks to be used are of one size the posts should be fixed to suit them. Thus, if they are 4 feet deep, 2 feet apart will be right, one sack covering two spaces.

Open the sacks out at the seams, make the edges level and nail securely to the posts, stretching as tightly as possible. Thin nails driven in two-thirds of their length and clinched on the upper third do the work well. When the frame has been covered, the following materials are prepared:—Cement 12lb, lime 2lb, salt 1lb, powdered alum ¼lb, water about 6 quarts.

Mix the lime and salt and sift if necessary. Add the water and stir well. Next stir the cement in well. If the mixture is too stiff to work with a brush, add water carefully. The resulting slurry should be thicker than ordinary whitewash, but not so stiff that it cannot be brushed into the fabric. When the mixture seems about right, stir in the alum.

The sacks should be thoroughly wetted with water on both sides, and the mixture then applied immediately. Brush a coat evenly on to the outside, working it well in and then go over the inside in the same way. Before the mixture sets add another coat to the outside.

The work sets hard in a day or so and is firm and solid, but not brittle. If not considered strong enough, more coats can be added outside at any time, or, of course, boarding may replace it near the ground, where damage from stock, such as pigs, is possible. Exceptional strength can be had, especially if required for roofing, by adding a second or even a third layer of sacking, each being put on while the surface of the work is wet and immediately covered with the mixture.



A REFLECTOR FOR THE MAIL BOX.

On country roadsides, the sight of a crashed mail box is not uncommon. Here is a bright idea that should preserve the mail box from night driving recklessness or from accident that even the most careful car driver may, at the moment, find it difficult to avoid: Fasten a bright reflector on the proper side of the box, as shown. An ordinary small bicycle reflector will do for the purpose.

A. H. TUCKER, Government Printer, Brisbane.